



FRIDAY, MARCH 23.

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## Contributions.

### The Cause of Shock.

WATERTOWN, N. Y., March 13, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read the communication of "G" and your editorial on the subject of the cause of "shock" in freight train brakes, and as I know something of what has been done in Burlington, I would like to bring to your notice a theory of my own on the cause of shock due to oscillation in a "mixed" train.

Let us assume the case of a simultaneous brake applied to a mixed train with loose couplings. It is true that if the application of the brake travels faster than the first shock due to that application, the former will not be appreciable in a uniformly loaded train, but why the shock caused by oscillations in a mixed train cannot be felt, has you say, never been clearly explained. My theory is, although a shock undoubtedly exists in every mixed train, when the brake is applied, whether it can be felt or not depends entirely on how the train is mixed. For example: Suppose we consider a 50-car, loose-coupled train, 25 of the cars heavily loaded and 25 light, all equipped with the new Westinghouse brake, with the leverage equally proportioned throughout the train, and the power not great enough to skid the wheels of the light cars.

First, let us mix the train in the following manner: place all the loaded cars in the front half of the train next the locomotive, and the light cars in the rear. Now, when the simultaneous brake is applied, what is the result? We know from experience that the application of such a brake will reach the last car before the shock due to that application can even get started, consequently that shock will not be felt, or rather there will not be any. But let us examine the condition of the train, say 2 or 3 seconds after the application. We find the link and drawbars between the 25th and 26th cars extended, and a decided pull there due to the fact that the rear half of the train being light and braked with a power well proportioned to the weight on the wheels, tends to stop quicker than the loaded cars in front with their greater momentum and insufficient braking power. A severe shock must have occurred here to cause the decided strain on the drawbars. It must have started in the middle of the train and traveled both ways. For convenience we will call this an "extension shock." There may have been no slack at all in the train when this shock occurred, then it would be felt instantaneously throughout its length.

Next, let us reverse the case and put the locomotive on the other end of the train. Now we find an entirely different result when the brake is applied. The light cars ahead tend to stop sooner than the heavy ones in the rear. Here we get a severe "compression shock," starting from the middle and running both ways.

The third trial necessitates mixing the train differently.

Suppose we alternate the light and heavy cars; apply the brake and study the result. No shock whatever is felt anywhere in the train! Why? because 50 separate and distinct shocks actually occurred but each one was of opposite character, "compression and extension," at each end of a car, and they counteracted or equalized each other.

I have shown how a train can be mixed to produce a shock due to oscillation and how it can be arranged to entirely obviate it. The conclusion is that if too many loaded or too many light cars be placed together in a train equipped with a simultaneous continuous brake, a shock of more or less severity will be noticed, but by "judicious mixing" a freight train can be safely and successfully managed with such a brake.

E. C. BOYNTON.

[The conditions of the Burlington brake tests of 1887\* state that the "mixed" train shall be composed of "50 cars, two-thirds loaded and one-third empty, 75 per cent. of the latter being on the front half of the train." This distribution of the empty cars was de-

\*These conditions were given in full in our issue of Feb. 11, 1887, page 93.

signed to imitate ordinary practice as closely as possible, and certainly made the test more trying and rendered it more likely that shock would be felt than if the empty cars were equally distributed throughout the train. If no shock was felt under these trying conditions, it is tolerably evident that simultaneous application effectually prevents shock being felt.

It, therefore, appears evident that the essential feature is to apply the brakes before the shock reaches the rear cars, and that the distribution of the empty cars is comparatively unimportant.

The friction between the braked wheels and the rails practically anchors the car and absorbs the shock and has the effect of preventing the shock being felt, much in the same way as a large or a firmly anchored ship is undisturbed by a blow that would move a small vessel or one simply floating on still water. In the latter case the vessel yields to the blow; in the former, it can resist the blow and is undisturbed.—EDITOR RAILROAD GAZETTE.]

TO THE EDITOR OF THE RAILROAD GAZETTE:

The article in your issue of March 9, entitled "Freight Train Brakes," would seem to have been written under a misapprehension of my contention, which was simply, that trains coupled totally without free slack could be stopped by a head brake, from whatever speed, without shock, and that this was irrespective of length of train or of varying weights of respective cars. Trains containing free slack will, or may, experience a bunching shock; but, if head brake is sufficient for its duty, there will be no other. Please note that I don't even postulate a train brake of any variety.

I am aware that drawheads were wedged apart at Burlington, and that shock was not thereby prevented. But this fact does not validate my position.

G.

[It is evident that a brake at the head only of a train will give a shock directly proportionate to the power and quickness of action of the brake; while it is difficult to believe that calling a shock "a bunching shock" will prevent cattle being thrown down and end posts broken.—EDITOR RAILROAD GAZETTE.]

### Curve Resistance and Rail Wear.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In spite of the practical tendency of rail standards on the best roads to increase the side angle of the head with the vertical, with the effect of widening the under side of the head and giving more bearing on the fish bar and a greater body of metal to resist flange wear, there is a feeling among many railroad men that these advantages are bought at the expense of loss of motive power by increased flange contact and consequent rubbing.

Let us see what this amounts to. When a train is on straight track the slight coning which even the most extreme opponents of coning give to the tires, keeps the wheel centered and the flanges out of contact with the rail. When an engine enters a curve, the leading wheel flanges run close to the outer rail, the drivers close up more or less to the inner rail, but observation shows that they rarely bear much against it, owing to the constant tendency to slide away, due to the rolling forward of the inner wheel with its shorter run.

The car wheels are all drawn toward the inner rail by the pull of the engine, but they bear little, if any, against it, from the same causes which keep the engine drivers away. Whence, then, it will be asked, the tremendous side wear of the rails, shown by the specimen from the Lehigh Valley, illustrated in the *Railroad Gazette* last year? The answer is simple. From the crowding of the train to the outer rail in descending a grade with the engine brakes set. If this be the cause, of which there can be but little doubt, what is the result? Just so much wear transferred from the brake blocks to the wheel flanges and rails, and no loss of motive power whatever. This is an undesirable transfer of the braking wear, but, so far as it cannot be avoided, it is better to transfer it as far as possible to the rail and avoid the cutting into the throat of the flange, which a plumb-sided rail head inflicts upon the tire.

The widening of the rail head appears in almost every light a desired consummation. It gives a wider wearing surface to the wheel and a more symmetrical form to the rail regarded as a beam. For the same weight and height of rail it puts the metal further from the neutral axis, and by opposing a larger skin area to the wheel on top offers more resistance to the peening action of the wheels, which is constantly thrusting down the joints and hoisting the rail centres in spite of the best direct efforts of the trackmen.

It seems questionable whether our steel rail sections do not suffer in shape from their development out of iron rails. In the latter a considerable depth of head was necessary to avoid the splintering off which we all remember as the characteristic form of wear in iron rails; but who ever sees a good steel rail worn out in this way? It loses its shape entirely by head and side wear. Long before the head becomes too thin for the support of the wheels the top has become too irregular to offer a good running surface.

A further advantage of greater width and less depth of rail head would be the better shape of the rail regarded as a girder; the metal being placed further from the neutral axis and more symmetrically with the lower flange. This point

and the difference of wear between iron and steel rails is neglected by the advocates of pear-shaped heads.

W. HOWARD WHITE.

[Some comment on this letter will be found in the editorial columns.—EDITOR RAILROAD GAZETTE.]

### Common Sense in Snow Storms.

NEW YORK, March 20, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

While it is not probable that the recent snow blockade in the Eastern and Middle states will be equalled for many years, the lesson which it has taught should be carefully remembered, in case of a future and similar emergency. The reckless charging of mammoth snow drifts may be magnificent, and when successful may furnish material for future round-house stories, but it is not a practice to be generally commended. The loss of life and property on the Harlem road, near Sharon, N. Y., by an attempt to force a passage through a rock cutting, may be cited as a striking example of foolhardiness, if the newspaper reports of the affair are trustworthy.

The storm ceased on Tuesday. On Friday, after two days had passed, a working train of five locomotives with a snow plough and two cabooses, reached a rock cutting about 150 ft. long and 30 ft. deep, filled with snow, which under the influence of two days' sun had settled into a practically solid mass. Common sense, to say nothing of experience, should have pointed out the danger of driving five coupled locomotives into such an obstruction, at the rate of 40 miles an hour. It was done, however, and the superintendent claims that this was the quickest way to raise the blockade. Was traffic over the Harlem road of sufficient importance to justify the death of five men, the injury of four others and the wrecking of five locomotives? Reports from the various blockaded railroads in the vicinity of New York show that the most serious delays in opening up the tracks were caused by the derailling of locomotives and cars. During the two days which had elapsed since the storm, the cut near Sharon should have been shoveled out, and there were no doubt plenty of men who would have undertaken the job at reasonable, or if necessary at unreasonable, wages. It is evident though that in the absence of telegraphic communication, no authority exists for undertaking such work without instructions from headquarters.

The writer was agent of the Housatonic Railroad at Pittsfield, Mass., during the great storm of 1866, which was almost identical in severity with that which New York has just passed through. Without instructions and without a locomotive, but with a force of about 100 men, as soon as the storm ceased, we "charged" the first cut with shovels. It was a quarter of a mile in length and 15 ft. deep, and filled up with snow. The men were distributed along it in gangs of about a dozen, each of which sunk a "shaft" and the men worked in both directions. They were soon out of sight in the snow, and the section boss was told to drop his shovel and visit the pockets in turn and see that the men worked faithfully. The plan was so successful that the track was cleared before the similar cut on the Boston & Albany, although the latter road had five times the number of men working at the ends, who were so numerous as to be in the way of each other. The result was that when the first train reached our territory, instead of butting snow for half a day, it went directly through to the station, and the line would have been open within 24 hours had it not been for a wreck at Glendale curve, 18 miles below, caused by a fruitless attempt to force a cut. Through a settled country plenty of men can be hired in the winter, and 5,000 of them at \$3 or even \$5 per day intelligently handled would be cheap compared with the delay and loss attendant upon "modern" methods of charging hard snow drifts with out exercising proper judgment.

Colonel R. E. Ricker, when superintendent of the Central of New Jersey, appreciated the serious nature of a snow blockade when he issued one of his characteristic bulletins to station agents and others, giving them authority to employ assistance, with detailed instructions as to the comfort and welfare of the force. It closed with the following vigorous sentence, as nearly as can be remembered after a lapse of sixteen years: "Ample supplies of provisions must be furnished, including plenty of bread and an abundance of good, hot coffee. The men must be well fed, and equally well worked." No failure of a telegraph system could nullify the effect of such instructions, and the march of improvement has not rendered them obsolete.

X.

### Proposed Mail Compensation.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. Townsend's bill for re-adjustment of mail compensation upon railroads was brought up before the first session of the Fiftieth Congress and will probably be acted upon in some manner before the close of the present session. This bill, which contains essentially the same features as bills which have been introduced from time to time since 1884, makes a radical change in the manner of paying for mail service on railroads and its effect upon the revenues of the roads would be very marked. As I do not remember having seen this subject treated upon in the columns of the *Railroad Gazette* it may be of interest to trace in part the effect which the terms proposed in this bill would have upon railroad mail revenues.

Leaving out minor provisions of the bill, we find that two general rates are proposed for mail compensation; one when pouch mail alone is carried and the second when a postal car is used, whether such car be a route agent's compartment in a baggage car or a regular railway post-office used for mail



purposes alone. The unit of compensation is the linear foot in length of a car not less than 8 ft. and 6 in. wide. Each 500 lbs. of pouch mail carried over the road is considered as 1 ft. and will be paid for at the rate of 5 mills per foot per mile run. It will be noticed that this rate equals 2 cents per ton per mile.

The postal-car service is to be paid for at the rate of 6 mills per mile on lines using 25 ft. of car length, 5 mills per mile on roads using 40 ft., and above 40 ft. at the rate of 4 mills per foot. Two thousand pounds carried is rated at 25 ft., and 4,000 lbs. 40 ft.; 6,000 lbs. is allowed 50 ft., which at 4 mills per mile would equal 6 $\frac{2}{3}$  cents per ton one mile. Extra allowance is to be made on both closed and post-office mail at the rate of one-tenth of a mill for every two miles over 20 miles per hour in speed of trains carrying such mail.

Suppose we take for example a line carrying over a distance of 200 miles a mail of 4,000 pounds each way, or 8,000 pounds per day over the whole line and at an average speed of 30 miles per hour. If the mail consisted of closed pouches simply, the compensation under the old schedule would be as follows: Compensation for 8,000 pounds daily over line of 200 miles, at

\$287.50 per mile of road ..... \$47,500.00  
Less 10 per cent. act of July 12, 1876 ..... 4,750.00

..... \$42,750.00

Less 5 per cent. act of June 17, 1878 ..... 2,137.50

Net compensation to R. R. Co. .... \$40,612.50

Under the proposed bill, the railroad would receive as follows: 4,000 lbs. mail each way calls for 1 ft. for each 500 lbs., or 8 linear feet, at one-half cent per mile (400 miles), for say 313 working days—

8 × .5c. × 400 × 313 = ..... \$5,008.00

Add for extra speed 10 miles per hour .05c. × 8 × 400 × 313 = ..... 500.80

..... \$5,508.80

This, it will be noticed, is only about one-seventh of the present rate. If the above mail was carried in postal cars instead of being closed mail, the road under present rates would receive as follows:

For mail proper as above ..... \$40,612.50

Add for 1 line 40 ft. postal cars 25.00 × 200 miles = ..... 5,000.00

Result to railroad ..... \$45,612.50

Under the proposed schedule the rate would be 4,000 lbs. each way at an allowance of 40 ft. of linear space at 5 mills per foot per mile.

40 × .5c. × 313 × 400 = ..... \$25,040.00

Add for 10 miles per hour extra speed 40 × .05c. × 313 × 400 = ..... 2,504.00

..... \$27,544.00

Total to railroad ..... \$27,544.00

This it will be noticed is but slightly over half of the present rate.

Let us take still another case, i. e., that of 1,000 lbs. of mail over the whole road, or 500 lbs. each way, in what is known as a route agent's compartment, being a complete railroad post-office, but occupying only a portion of the car. The present compensation would be:

200 miles × \$100 per mile = ..... \$20,000.00

Less 10 per cent. .... 2,000.00

..... \$18,000.00

Less 5 per cent. .... 900.00

Net result to railroad ..... \$17,100.00

Under the new arrangement 500 lbs. of mail matter would be entitled to 13 ft. at six mills per foot.

Hence 13 × .6c. × 400 × 313 = ..... \$9,765.60

Add for ten miles per hour extra 13 × .05c. × 400 × 313 = ..... 813.80

..... \$10,579.40

Here we find that the new rate is about two-thirds of the old one. This class of rates is that which holds perhaps on the majority of roads in the country where the business is not heavy enough to warrant a separate postal car, and route agents' compartments are used instead.

Another disadvantage in the proposed method of compensation, it seems to me, is that in making the experimental weighings from which the weights are to be determined, records must be kept for the closed mail and that carried in postal cars separately, thus involving much additional trouble and detail. At present only one class of weights has to be taken, the additional payment for postal cars being determined by the actual length of cars used.

The new rates will fall the heaviest on the larger roads doing a heavy mail business calling for lines of postal cars. For such business we see the rate cut down about one-half. The larger roads also carry, as a rule, large quantities of through closed mails. If it is intended that these shall be carried at the closed mail rate it will be noticed that the reduction would be very marked. Taking all classes of mail traffic into consideration it does not seem unreasonable to predict that the proposed rates would cut the average mail compensation to railroads down one-half and to rates which, in the opinion of the best judges, will not cover the cost of doing the business. In view of this estimate it would seem as if all interested should scan the provisions of the bill in question carefully, and if the result confirms the views put forward in the foregoing, all legitimate means should be used to bring about a modification of some of the features proposed. \*\*

#### The Johann Journal Box.

MARSHALL, TEXAS, March 16, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am in receipt of the following letter from Philadelphia, March 6:

"Please send me blue print of your end stop for car journal and boxes.

"How long since you first applied them? Is there much wear to them since put in service? (Signed)

"J. SCOTT, Philadelphia, Penn."

As the writer has given no specific address, and as the answer may be of interest to others who are experimenting with the axle and box, I take this means of publicly answering the letter.

I first began to use the general principle of this axle and box in 1859 on the Missouri Pacific road and experimented with it during 1860 and 1861, but at that time had no provision made for preventing the end stop from working up and out of place. This annoyance, in conjunction with the stirring times of the Civil War, causing more or less demoralization, led me to stop working with the device at that time. There are men alive to-day, however, who will have distinct recollection of having had the device applied to the tenders of their engines.

I did not do anything farther towards improving it until about 1878 or 1879, when I again took the matter up and brought it out in its present form. As the Master Car-Builders' standard axle and box had been adopted and was fast coming into general use at this time, I did not push the use of the end stop journal box, and laid it away once more. In 1885, however, when the use of 60,000-lb. capacity cars began to be agitated strongly and the use of a heavier axle became a necessity, I took the matter up again, as I was thoroughly convinced that the axle and box as designed by me would fit the requirements of a car truck having sufficient strength to carry the increased imposed load.

I then had a new set of patterns made and commenced using them practically in their present shape, and an engine on the Chicago & Atlantic Railway has had a set of trucks under tender, having the device in its entirety, for about two years, and it is still running. We also have a number of them running under tender and car trucks on the Texas & Pacific Railway.

JACOB JOHANN,  
Supt. M. P. & R. S.

#### Some Lessons of the Strike.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The necessity of a better feeling between employer and employé must be the lesson learned from the recent strikes. Whether it be a shoemaker or a railroad company, the closer the relation between the employer, or his representative, and the employé, the better the understanding when any differences arise. Organized labor cannot but recognize the fact that labor is but a commodity governed by the law of supply and demand, and so long as the employer can get labor at his own price, none but those directly affected should enter into the controversy, if such exists; and to prevent such controversies there should be a closer relation between employes and employer. Encouragement should be given to such a feeling as would lead every employé to speak for himself, and not, as is too often done, leave his case to be settled by the one who has been selected, through his natural ability as a leader, to act as chairman of the grievance committee. Men are too apt to stand in awe of their employer, and only the impetuous and often hot-headed leader will espouse what, in his individual opinion is the cause of all, while, in fact, he is only airing his own condition.

Labor organized for the mutual protection of its members has a worthy object, but when power is used to fight a well known principle of supply and demand, all is wrong. This is often because the employer is not acquainted with his employes. Nowhere does this relation need to exist more than between the railroad superintendent and his men. An operating officer is often known by the personnel under him. The proper *esprit du corps* existing among his men with the feeling that he (the superintendent) is one of them, very often smooths over the rough edges and renders the duties of the superintendent more easy; and as a matter of policy the writer wonders that every wide awake superintendent does not make this his aim, to cultivate the good will of his men and encourage them to come to him when they think they are not treated fairly.

The principal trouble with the Brotherhood of Locomotive Engineers seems to be that all differences between the men and the company are to be settled by a grievance committee, which is frequently composed of men of dispositions quite inconsistent with moderate deliberations and unbiased opinions. Thus we find many advocates of settling all differences by arbitration, because the hot-headed leader of the grievance committee and the official of the company cannot agree (and quite naturally), while if the individual opinions of the men could be had, and the question be put to a vote with the majority to rule, we should seldom hear of a strike. Their case is indeed a desperate one when the engineers attempt to dictate to their own company what freight shall or shall not be hauled, when they expect to be paid regularly for their services, and yet will not allow the company who employs them the means of earning their wages. Aside from all state or inter-state laws, railroad companies should maintain their rights and not submit them to their men to act upon. If the railroads would take a lesson from the Brotherhood and be as loyal among themselves, there would be no danger of the present trouble spreading; but they are too vacillating in their actions and too prone to be governed by their own notions rather than by what seems, to the majority, to be the best for all concerned.

SUPERINTENDENT.

#### The Manomatik Brake.

The main principle of the brake is exceedingly simple, though, being novel, the details may appear somewhat difficult to comprehend. The main principle that a simultaneous onward movement of both drawheads shall apply the brake is believed to insure its prompt application whenever required. The equally important requisite that the brake shall remain off in backing and switching and whenever its appli-

cation is not desired is also believed to be secured by the means described below. When the two drawheads are compressed in succession the brakes are applied for an instant and then released and remain off.

The following description of the brake will explain the methods by which it is proposed to carry these principles into practice:

The Manomatik train-brake is a lever-momentum brake, operated by power transmitted from either drawhead (or from both conjointly) through their buffer springs; and rendered perfectly automatic in the performance of its duty by reason of the relations to each other of the two drawheads in their several service positions. An inthrust movement of either drawhead will apply the brakes and immediately release them, unless the timely inthrust of its fellow drawhead protects them against such release. When the car is in a train moving to the front, and the brakes are applied by the car's own momentum, the momentum of the following car will confirm their position. But if brakes are applied by a pushing or backing engine, they will be instantly released, because not so protected by the opposite drawhead. This arrangement insures that, whenever a car is moved or is in motion its brakes will assume and maintain the required position.

To obtain these results the inventor removes the usual abutment from behind the after followers *A* of the draw-gear, and replaces them by levers *B*, swiveled at their centres, and with their lower ends in the path of the followers *A*. Pull-rods *C* are attached to the upper ends of these levers, and these pull-rods are extended to the middle of the car, where they are attached to, and operate, the brake machine. The brake machine consists essentially of a bed-plate, which takes the brake stresses upon itself, and is bolted to one of the car timbers. The brake windlass *D* is borne upon an arbor that traverses the bed-plate, and carries a rock-arm *P* upon its opposite end. Upon either side of, and equidistant from, the centre of this rock-arm the slotted ends of pull-rods *C* are supported by pins, so that a pull upon either rod will move the rock-arm in the same direction always, and without interference from the movements or quiescence of its fellow. A hook on the lower end of said rock-arm is connected by a link *L* with one end of an equalizer *M*, that has its opposite end connected by a similar link *N* to another hook, which constitutes the right-angled short arm of the pawl-lever *O* (borne upon the same main arbor) and its movement evidently tends to rotate *D*, and so create a tension in the brake-chain that is wound upon its face, and the ends of which are connected to the brake-gears upon the respective trucks.

The windlass *D* has ratchet teeth upon its periphery, and its movement is effected by the engagement with them of the pawl *Q*, borne upon the end of pawl-lever *O*, and kept in normal engagement by a spring or counterweight. The equalizer *M* swivels upon a spring-pin, so that after the brake-shoes are seated against the wheel-treads, further drawhead movements are expended against the relief-spring *R*. The resistance of this spring is intended to be sufficient to completely compress the buffer spring.

It will be noticed that this arrangement converts the wheel treads into an abutment for the drawheads, removes all obstructions from the path of the lagging drawhead, and compels the operative drawhead to move a distance equal to the compressibility of its own buffer spring, in excess of movement required of lagging drawhead to produce like movements in pull-rods *C*. Note also, that if the drawheads be so devised that the act of coupling shall impose an initial tension upon the buffer springs, there will not only be no free slack between the cars, but a broken coupling will at once cause the brakes to apply.

If "momentum" brakes are ever to be practical devices they must embody some contrivance whereby the constantly accumulating slack of the brake-chain, caused by the wear of brake-shoes, shall be automatically eliminated; for, unlike air brakes, the motor stroke is strictly limited. The inventor has accordingly added the device *S* of a dog bearing lever and arm *S*, arranged to turn freely upon said main arbor between the limits fixed by pin and slot at *T*. Obviously if, in putting brakes on the ratchet wheel *D* moves further than is permitted by the slot and pin *T*, the dog will slip over the next tooth and will prevent *D* from giving off, when brakes are released, more than the predetermined length of brake chain. Consequently the spacing of the ratchet teeth determines the total differences that can ever exist in the free length of the brake-chains.

If a car was never to be backed or pushed the brake would now be complete. But it is demanded of a momentum brake that the onward stroke of the drawheads shall apply the brakes when the momentum of the cars is to be controlled, but is not to apply them in cases where the car is being pushed. In other words, useful impulses received from inward movement of the drawheads are not to be impeded by the brakes, but restraining impulses are to be responded to and assisted by the brakes. Fortunately any pressure on the drawhead which tend to propel the car, tends to force the opposite drawhead against some obstacle, and then to move the car upon or over this opposite drawhead before its inward stroke can counterbalance that of the actuating drawhead. Therefore, if the actuating drawhead applies the brakes at its first inward movement, so that the car cannot move, it is pretty certain, the impulse continuing, to be fully driven in. And if such full solitary compression is caused to trip and release the brakes that its own earlier movement had applied, and such release was permanent until the full withdrawal of drawheads had restored the normal arrangement, there would be no danger of the brakes being applied when they were not required.

On the other hand, if the car is in a train moving to the

front and the engineer applies brakes to his engine, the momentum of the cars will cause them to close, thus applying pressure to both drawheads. As explained above, the actuating drawhead has twice as far to move and encounters all the resistance. As the leading car has brakes on and the following one has not, it is clear that under such circumstances the leading drawhead can never complete the last portion of its stroke before the trailing one will have reached the middle of its intrust movement. Consequently, if this partial inward stroke of the hind drawhead is arranged to prevent the brakes from being released by the full inward stroke of the other, the brakes will remain on and effective until the full withdrawal of drawheads restores the normal condition.

The device that accomplishes this is called the "trip." A small shaft *U* traverses the bed plate and has fixed to one end a "lift lever" *K*, which lays normally under a lip protruding from one side of the main pawl *Q*. If, when the brakes are on, this small shaft be slightly rotated in the proper direction, this lift-lever will be caused to force the pawl *Q* out of engagement with the ratchet on *D*, thereby releasing brakes. A slotted pitman *J* tends to produce this amount of rotation during the last part of the full inward stroke of the drawhead, as the drawings show; but this pitman does not rotate the shaft directly, but a sleeve *G*, which is loose upon the shaft, and which can affect the shaft only by the engagement of dogs *F* with the cam teeth *H*, fixed upon the shaft. Pins *E* in the pull-rods *C* trip the dogs *F*, disengaging them from the teeth whenever an inward movement of its drawhead has caused the pull-rods to move through about one-half of the possible movement. Counterweights serve to return the dogs to their normal position of engagement whenever the drawhead is withdrawn. It follows that whenever the brakes are put on, one of these dogs is inevitably tripped. If the other is not tripped, the brakes will immediately be released. But if the other drawhead has moved in sufficiently to trip the second dog before the last portion of the inward stroke of the first drawhead has begun, the brakes will not be released.

This is claimed as being the first fully automatic momentum brake that has ever been devised, and that is independent of the speed or the direction in which the car is running, having no attachments to trucks or axles and as satisfactorily responsive to the train's need for brakes or for freedom from brakes as if it were endowed with brains.

#### New England Railroad Club Meeting.

##### WHEELS AND TIRES.

The annual meeting was held March 14, 1888. President Lauder occupied the chair. Mr. Francis M. Curtis, Secretary and Treasurer, read his report for the past year, which showed the receipts of the year to have been \$532.93; expenditures, \$366.10; balance on hand, \$166.83. There are 193 members, and the average attendance at the monthly meetings has been 64.

The committee appointed at the last meeting to nominate officers for the ensuing year reported the following: President, James N. Lauder (Old Colony); Vice-President, George Richards (Boston & Providence); Secretary and Treasurer, F. M. Curtis (Old Colony); Executive Committee, J. N. Lauder, F. D. Adams (Boston & Albany), J. K. Taylor (formerly Boston & Lowell), J. W. Marden (Fitchburg), Osgood Bradley, A. M. Waitt (Boston & Maine), Albert Griggs (Providence & Worcester), J. T. Gordon (Concord), and J. A. Coleman; Finance Committee, James Smith, C. W. Sherburne, Isaac N. Keith, Robert Johnson, Charles Richardson, Joel Hill, A. G. Barber, Daniel S. Page and George Dunbar.

The report of the committee was unanimously adopted, and the president expressed his thanks for his re-election, and said that in his opinion no man should hold an office in the club for more than two consecutive years, and that he should not be a candidate for another term, after this had expired.

The president announced as the subject for discussion for the evening the same as occupied the attention of the club at the last meeting.

WHEELS AND AXLES, AND THEIR RELATION TO THE TRACK. Prof. C. F. Allen, of the Massachusetts Institute of Technology, read the following paper:

In determining what kind of a wheel should be used, there are two considerations of superior importance—safety and cost. I intend to discuss only the question of safety.

If any particular type or class of wheels does unquestionably possess any considerable advantage in respect to safety it is important to know it. What is wanted, however, is a wheel that is absolutely safe. It is unsatisfactory to theorize deeply as to the comparative or absolute safety of wheels. The only satisfactory argument is facts. Unfortunately, in this country anything like complete records touching the safety of wheels is almost entirely lacking. In Great Britain, however, for a number of years past the returns and records of the failures of tires and wheels are very complete, as shown in the following abstract of the British Board of Trade reports on accidents.

In Great Britain chilled cast-iron wheels are never used on railroads. The reports therefore deal entirely with tired wheels. The material of the body of the wheels is in general

either wrought iron or wood, and the tires are of wrought iron or of steel. The table shows that danger from the failure of wheels, as distinct from tires, is almost absolutely done away with. During the past six and a half years the failures of wheels give a total of eleven only, with a record of none killed and five injured from this cause in a long series of years. We may therefore fairly say that in the English methods of wheel manufacture substantially absolute safety has been secured, so far as danger from the failure of the body of the wheel is concerned.

The record does not show what proportion of the steel tires in use fail each year, nor what proportion of the iron tires in use fail each year. Consequently, we can determine little or nothing as to the comparative liability to breakage of steel and iron tires. It is perfectly clear, however, that steel tires fail as well as iron tires, and in considerable numbers, and in cases in the past serious accidents have resulted from the breakage of steel tires. These records show that we cannot expect to secure anything like absolute safety simply from the use of steel as the material for tires.

It is a creditable showing in this table, that during the last four years the total failures of tires each year have steadily decreased from 1,247 in 1883 to 886 in 1886; that since 1882 93 per cent. of the failures have been on "wagons" or freight cars, and 68 per cent. on "wagons" belonging to

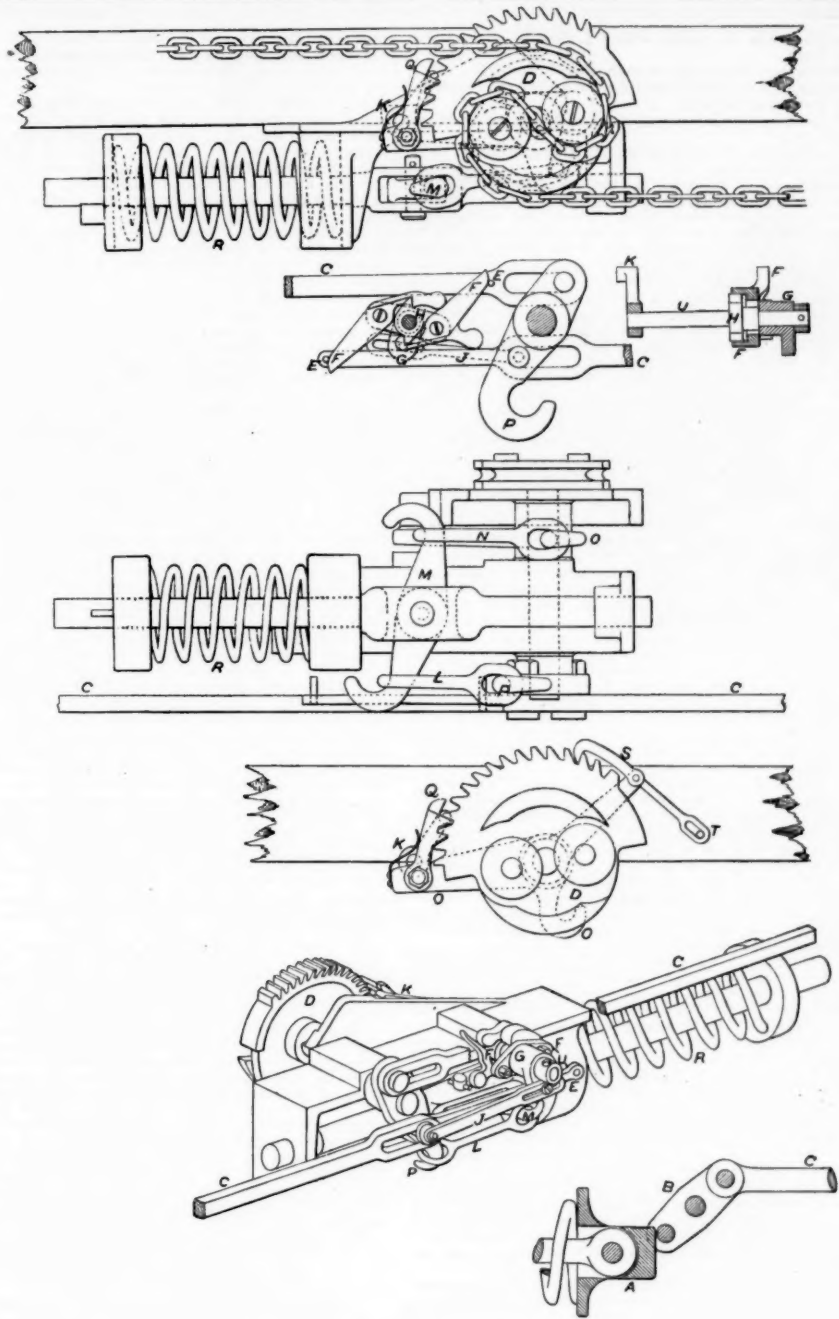
private parties. We are, perhaps, more concerned in the fact that during the past ten years the total failures of "carriage" or passenger-car wheels have been only 104, an average of about 10 each year in all Great Britain.

It appears that of all the tires that failed 90 per cent. were attached to the wheels by bolts or rivets, but it also appears clearly that this method of fastening was not the cause of failure in a great majority of cases.

The most satisfactory feature of all is the fact that for 7½ years past there has not been one person either killed or injured from the failure of tires, and for 11½ years past not one killed and but five injured. The record of the six years previous to 1876 shows a marked contrast. In these six years 52 persons were killed and 202 injured—an average of more than 8 killed and 33 injured each year. Of these six years there was but one year in which no person was killed and no year in which less than 8 persons were injured. It cannot well be accounted for by "chance" that in 11½ years, beginning from Jan. 1, 1876, there were none killed and only 5 injured, while during the six years preceding this date there were 52 killed and 202 injured. The cause of this improvement was the use of better wheels, and especially of improved methods of fastening the tire to the wheel instead of the faulty and unsafe method of attaching the tire to the wheel by means of bolts or rivets. A broken tire caused an accident in 1874 in which 34 passengers were killed and 65 passengers and 2 employees were injured. The tire was an iron tire, fastened by four rivets, and when broken flew from the wheel, ditching the train. Several accidents from this cause occurred in 1873, and Captain Tyler reported as follows:

"This accident was occasioned by the failure of a steel tire on the leading wheel of the engine, and it resulted in loss of life and serious injury to many persons. \* \* \* It is probably impossible in the manufacture of tires and in applying them to the wheels of locomotive engines or railway vehicles, to provide against their occasional failure in this manner; but it is possible, as I have frequently and during many years had occasion to point out, almost absolutely to prevent danger to the passengers and servants of railway companies, in the event of their failure, by attaching them to the rims of the wheels by methods which will prevent them flying off the wheels. \* \* \* The danger consists not in the fracture, but in the probability of the tire flying suddenly and violently from it (the wheel) when fracture occurs." He proceeds to state the principles upon which the

\* The number of passenger cars (excluding baggage cars, etc.) in Great Britain in 1883 was 32,304, which may be taken as the mean or average number during the ten years referred to. Allowing on an average five wheels per carriage, the total number of wheels would be 161,520, and an annual of 10.4 tire failures would be one failure per annum in every 15,530 wheels running.—EDITOR RAILROAD GAZETTE.



THE MANOMATIK MOMENTUM BRAKE.

FAILURES OF TIRES AND WHEELS ON THE RAILROADS OF GREAT BRITAIN.

YEARS.	No. of tires failed.	Class of rolling stock.						Material of tire.		How fastened.	Character of break or failure.				No. of tires that left the wheel.	Casualties.			No. of wheels failed.		Casualties.	
		Engine....	Tender....	Carriage....	Van, ....	Railroad wagon.	Private owners' wagons.	Iron.....	Steel.....		At rivet holes.	At weld....	In solid....	Longitudinally or bulged..		Killed....	Injured....	Killed....	Injured....	Killed....	Injured....	
1887 .....	808	15	5	11	27	102	557	699	109	745	63	35	11	125	637	9	0	0	0	0	0	0
1886 .....	886	18	6	20	18	218	586	727	137	791	95	44	8	141	673	16	0	0	1	0	0	
1885 .....	970	20	10	4	16	224	648	809	111	867	53	31	6	129	754	6	0	0	1	0	0	
1884 .....	1,060	24	4	5	22	286	719	974	86	988	72	37	16	126	881	4	0	0	2	0	0	
1883 .....	1,247	53	16	5	30	313	830	1,100	147	1,167	80	51	21	149	1,026	8	0	0	3	0	0	
1882 .....	1,205	40	20	13	28	215	889	1,043	163	1,110	105	48	7	169	981	0	0	0	1	0	3	
1881 .....	1,286	46	46	8	55	210	901	993	293	1,134	152	128	7	307	834	8	0	0	3	0	0	
1880 .....	1,238	50	50	13	40	199	886	923	241	1,090	148	96	13	275	914	11	0	0	7	0	2	
1879 .....	1,227	63	57	11	28	240	888	933	262	1,082	145	142	23	285	797	16	0	2	19	0	0	
1878 .....	1,634	83	28	14	45	313	551	783	249	913	121	115	56	317	544	21	0	1	20	0	0	

NOTE.—The figures for 1882 and 1887 are partly estimated. In each of these years the actual figures for only nine months are available, and in order to make a fair comparison possible, 33 per cent. has been added to the figures for nine months. From other data available, the killed and injured columns appear to be correct for the full year.



fastenings should be made, which I give in slightly condensed form.

1. There should be a clip on each side of the tire.
2. These clips should be formed with square shoulders, and not by a slanting dovetail.
3. These clips should be continuous on each side, and not intermittent.

4. The strength of the clips should be proportioned to the strains put upon them.

In another place, referring to the same matter, he says: "There have been instances of tires flying on fracture from the wheels when secured by clips on one side only, and by wedges or rings, or bolts only on the other side or in the middle. There have also been cases of the failure of wooden wheels. But there has not been a case, so far as I am aware, of a tire flying from a wheel when the double clip system has been adopted, and this system may be, and has been, adopted with iron as well as with wooden wheels."

The railroad companies of Great Britain have generally followed the recommendations of Capt. Tyler, and with the favorable results shown in the table.

Of the total of 10,233 failures of tires during 9½ years, 95 only left the wheels, an average of about 10 each year.

Tracing carefully from 1873 to July, 1887, I have found a record of three tires leaving Mansell wheels in this time. These tires probably were attached to the wheels by the double clip system. It does not appear whether the wheels were at the time in passenger or freight service, or anything of the circumstances, except that in neither of the cases did any death or injury result.

The usefulness of a clip or retaining ring is shown in the Records of the Master Car-Builders' Association for 1882, where on the Grand Trunk Railway an English steel tire broke and opened ½ in. It was thought that it had been shrunk on too tight. Mr. McWood had great faith in the retaining ring, planed the tire inside so that it met and ran the tire in that way for nine months until it was removed for other causes. On that road there had not at that time been an accident caused by steel-tired wheels.

It has been stated that what is wanted is a wheel that is absolutely safe. It is clear from these records that such a wheel is in general use in Great Britain. The passenger wheel of Great Britain is a steel-tired wheel; but it is absolutely safe, not because the tire is of steel, but because it is fastened to a good wheel in such a way that it is held firmly in its place even when it breaks.

It is to be regretted that we have not in the United States records to show just what has been the performance of the different classes of wheels in use here. There appears to be nothing sufficiently complete to be conclusive. What data we have appears to be unfavorable in comparison with the British wheel; but in the absence of conclusive data it is not my purpose to make any comparison, but I believe that these records show a general type of wheel substantially absolutely safe, which may serve as a standard by which to compare all others until a superior record shall be unmistakably accomplished by some other.

The PRESIDENT: This paper has shown, what perhaps some of us were not aware of, how many tires of wheels may be broken without derailment, or without the tire leaving the rail and causing an accident. Possibly we have not a wheel in this country with proper fastenings, except a few fastened with the Mansell ring. Perhaps some one has facts in regard to other modes of fastening that hold the tire to the wheel in case of breakage.

Prof. ALLEN: I will state in relation to the data I have given, that while Captain Tyler in his report was referring to the Mansell ring substantially, the accidents happened, I think, in all cases where the tires were attached by bolts or rivets. Where these other forms of fastening are used, the danger is in the tire flying from the wheel.

Mr. RICHARDS (Boston & Providence): Prof. Allen has referred to wooden wheels, which are nearly universal in passenger service on English roads, the space between the hub and the tire being filled with wood, usually teak, the tire being secured by Mansell rings which have been used for many years.

Mr. ADAMS (Boston & Albany): We imported some of those wheels 14 years ago, but were obliged to abandon them, because the wood shrunk so much that the body of the wheel would move ½ in. under the tire. The wooden wheel is not suitable for this climate, on account of the difference in the amount of moisture in the air. Some two or three years ago we got more of them, and I think we have 16 running to-day. I have heard no complaint of them as yet, but I am afraid we may find the same trouble, and that it will not prove practically a good wheel for this climate. The larger proportion of the wheels we are using to-day are steel-tired cast-iron wheels, although we have some 250 with wrought-iron centres, with Mansell rings. The paper wheel has no Mansell ring on it, but the tire is secured by a wrought-iron plate each side, bolted through the web. If a section of a tire secured by a Mansell ring breaks out, it cannot escape very well, and the wheel will probably run to its destination. For 10 or 12 years we have used steel-tired wheels of some character in our passenger equipment, and there has not been a life lost on the Boston & Albany in consequence of a broken wheel in 17 years, or a person injured from a broken wheel under a passenger car; though we have had a good many wheels broken, but they have shown themselves in time to be taken out before an accident resulted. We have had cases of broken wheels this winter, which has been an unusually hard one for wheels, and perhaps some wheels have been run longer than was prudent, and the tires became too thin for safety. We have learned that by experience.

The idea has been prevalent that the constant use of a steel tire on the road reduces its tensile strength; but a recent test of a wheel which we had made at the Watertown arsenal proves that not to be the case. The securing of the tire to the wheel is of course an important point, and the Mansell ring is recognized as good for this purpose where the tire is shrunk on; but it is a question in the minds of some whether an entire steel wheel would not be better. All the recent wheels made in this country have the tires shrunk on, with the exception of the Fowler and the Washburn wheel, and secured by some kind of fastening. The Washburn wheel is welded together; the welds, as a rule, are good, but not always perfect. If they are, the wheel will run until the steel is almost worn out. We have run four or five hundred thousand miles with some of them, and they are good yet. Fifty per cent. of these wheels that we have removed from the passenger service have gone under freight cars, where they will be good for years. \* \* \* We would not run a wheel where the tire is shrunk on after it has worn to less than an inch in thickness; if the tire becomes thinner than that, it gets elongated and becomes loose on the wheel, and will then strain on the bolts and be somewhat dangerous; whereas the Washburn wheel, if the tire is perfectly welded, will run very much thinner, and yet be safe; but if there is the slightest imperfection in the weld it will increase and make it dangerous.

Mr. WHITNEY (Intercolonial): We had that English wheel 25 years ago, and discarded it as a wheel that would get loose. English wooden wheels do not appear to work as well in this country and in Canada as they do in England. The reason for this must be in the different conditions under which they are used. \* \* \* Another thing, they think

over there that this side the water is a good place to sell their old stock—anything they haven't any use for there. If they would give us a good honest tire, such as they use over there, we should have the same success.

Mr. COLEMAN: The method of making a wrought-iron wheel with a steel tire shrunk on to it is a bad one; the strain on the metal when it is shrunk on cannot be known, and it is a dangerous process. There is a difference in the expansion and contraction of the two metals, the wrought iron expanding one way and the steel another. I believe the wheel exhibited at the last meeting by Mr. Fowler has struck the mark. I don't think that will break.

The PRESIDENT: I think the best reply to Mr. Coleman is the experience of the railroads for the past 25 years with steel tires shrunk on to cast-iron wheels. I refer more particularly to the driving wheels of locomotives, where the service is more severe than elsewhere. Now the breaking of a tire made of first-class material, unless it has become so thin as to be unsafe, is so rare, the percentage of breakage is so small that the railroads of this country have said almost unanimously that it is not worth while to put on retaining rings. I can't remember an instance of breakage of this kind.

Mr. WHITNEY: One broke the other day 3 in. thick.

The PRESIDENT: It must have been of bad material or improperly manipulated. We commenced 23 years ago to use them and have never had one broken. About the thickness of tires, I agree with Mr. Adams that they become loose when they get thin. I don't think the tire used by the Paige Car Wheel Co. is subject to that objection.

Mr. ADAMS: I think the chief cause of defective tires is the presence of air in the molten metal, and where this occurs it will form a cavity in the bloom, and to this more than to anything else is due the fracture of tires. I never knew of but one case where the tire of a wheel broke across the section, but they break around the wheel, longitudinally; in other words, the tire splits, and this originates in a little blow-hole, and in rolling the tire that elongates and forms an imperfection in the steel, it does not adhere together at that point. If this is close to the surface it will probably show itself before it is turned, and the hammering will open the steel and perhaps produce a fracture entirely around the tire, as I have known to be the case. When this is concealed beneath the surface and becomes dangerous in the use of the wheel it will show, and that is why a steel tire is safer than an iron one. These fractures can always be detected by examination in time to take out the wheel before an accident occurs. The Washburn people make a crucible tire absolutely, and put it under a pressure of 200 tons when they make it. Years ago they did not do that and many of their wheels were broken, and there is where we get most of our failing wheels now from those made at that time; the defect is deep in the tire and does not show itself until it has made a long mileage. Those that are absolutely sound will run until they are worn down so that there is not steel enough to hold together. \* \* \*

Mr. ELLIS: With reference to the wooden wheels, Mr. Adams has overlooked one important point. The Mansell wheel that some roads tried to use 30 years ago was different from what is used now in England. That failed because the wood got loose. That wheel is no longer made in England. There have been a number of improvements in wooden wheels to avoid that very shrinkage; there are several devices for wedging the wood and preventing contraction or expansion. Mr. Adams mentioned some wooden wheels bought since that time for his road. I will venture to say that there is no evidence of contraction in those centres. The reports of mileage service in England show that the tires on wheels with wooden centres, for some reason or other, give a very much larger mileage than wheels with tires on wrought-iron centres. The wooden-centred wheel is used in other parts of the world where there are greater changes of temperature than in England, as in Germany, and also in Russia, which is a cold country. There was such a prejudice against it years ago, as the result of the trial of the original Mansell wheel in this country, a wheel that is no longer made, that it has been almost impossible to introduce it here a second time, in its improved form.

A committee of three was appointed to revise the by-laws of the club and to report at the May meeting the draft of a new set for the action of the club.

Mr. Richards suggested as the subject for discussion at the next meeting "Heating Cars by Steam," and the President announced that as the subject.

#### The Emmert Car Seat.

The accompanying engravings show the Emmert car seat, which in reality consists of two independent chairs, each provided with side arms and connected together in one frame so as to occupy no more space than the ordinary double seat.

Each chair is reversible, independent of the other, and each chair may be reclined in either direction. The two chairs being identical in construction, the subjoined description will therefore be confined to a single chair.

The side arms project up centrally from a main frame secured to the floor of the car. A pair of side supporting bars *D*, fig. 1, are pivoted to the base of the frame, or to the seat frame. These bars work between the side arms and normally extend upwards from their pivots at a slight angle, a little greater than that of the back relative to the seat.

The upper ends of these bars are connected by a cross-bar, above which is suspended a roll or pillow *F* between two brackets mounted upon the cross-bar, which brackets *E*, fig. 2, serve as handles to reverse the seat. This pillow or head-rest may or may not be adjustable relative to the back of the chair.

The back is pivoted to the side supporting bars at the upper edge and just below the cross-bar, being free to swing between the side bars as the latter are raised to a vertical position. It is, however, prevented from swinging too far in the opposite direction by links *I* pivoted to the lower side edges at one end and having a slotted connection with the pivots of the side supporting bars at their opposite ends.

The back being suspended between the side-supporting bars, the chair can be reversed by pushing or pulling the bars beyond a vertical line to their normal position upon the opposite side of the seat, when the back will simply swing across the centre and out to the opposite side of the chair, which movement is permitted by the slotted connection of the link with the pivot of the supporting bars. The back is therefore neither lifted or revolved in reversing.

The chair is placed in the reclining position in either direction by means of annular rings or plates *N*, figs. 1 and 4, which work in suitable recesses formed in the inner faces of

the side arms. These rings are provided with two sets of notches in the periphery which are alternately engaged by a spring catch secured to the centre of the side arms. These plates are also connected to the supporting bars by a radial arm having a pin engaging a slot in the bars, so that when the supporting bars are reversed the plates will be rotated, bringing the other set of notches into position for engagement by the catch.

The two sets of notches are located one on each side of the radial arm, one set being engaged by the catch when the chair faces in one direction, and the other set being engaged by the same catch when the chair faces in the opposite direction, the pin and slot connection between the supporting bars and the said notched plate serving to shift the plate whenever the bars are shifted or reversed.

There is one notched plate and one catch to each side arm, the catches preferably being sliding bolts working in recesses at the centre of the arms near the upper edge for convenience of manipulation.

In order to cause the back to automatically return to its normal upright position after being reclined, and thereby relieve the occupant of the necessity of operating the back by hand, notches are beveled as shown, so that the catch cannot engage the beveled side of the notches, and will, therefore, slide freely over the entire series until the back reaches its normal upright position, when the catch will engage the first or square notch of the series.

From this position it cannot be moved either backward or forward without the catch being first disengaged from the square notch and can then be inclined backward only until the next notch is engaged, and by successively operating the catch every notch may be passed, but no such obstruction will be offered to the movement of the back in the opposite direction, for as before stated it may in one continuous movement be returned to its normal upright position from any inclined position, and without manipulation of the catches. It is automatically returned by means of springs secured at one end to the floor of the car and at their opposite ends to a cross-bar connecting the lower ends of the side-supporting bars, which for this reason extend a short distance below their pivots.

These springs act as a power upon the bars to cause them to return to an upright position whenever relieved of the weight of the occupant, regardless of the direction in which the back is inclined; but so far as the operation of these springs is concerned, the point of attachment, either to the supporting bars or to a stationary point, is immaterial, so long as the desired result is attained.

The seat is inclined by the means clearly shown in fig. 1. Notches *V*, fig. 3, are cut in the frame of the seat, and are engaged by lugs *W* on the supporting bars. Hence, when the supporting bars are shifted to either side of the centre the seat will be slid in the opposite direction, that is, in the direction in which the chair is then facing, and as the inclines on the ends are forced against the cross-bars, the forward edge of the seat will be simultaneously elevated and projected before the chair is ready for occupancy. Some lost motion is obtained by enlarging the upper ends of the notches in order that the occupant need not rise from the chair in order to incline the back.

The back is prevented from swaying, due to the motion of the car or the action of the occupant of the seat next in the rear, by pins *B*, which, when the chair is in its normal position, engage fixed studs on the ends of the seat, preventing the inward movement of the link, and consequently the lower edge of the back.

When the chair is reversed, these pins will rise upward and pass over the studs and drop down behind the studs on the opposite side of the seat, locking the seat from a similar movement from that side of the chair.

In reclining the chair, the supporting bars, back and links will retain their normal relative positions until the back has reached nearly the extreme of its movement, when the links will engage another pair of studs or stops projecting from the inside of the arms or frame of the chair, and any further inclination of the back will cause the lower edge to gradually move inward toward a position parallel with the supporting bars.

The foot-rests are of the usual construction, and are held in their various positions by notched bars, which are hung upon the last mentioned studs which engage the links.

The points of superiority claimed for this seat are as follows:

1st. It can be reversed without lifting the weight of the back and letting it fall on the opposite side to jar and jam the seat.

2d. The back swings from the top, and cannot tip over backwards.

3d. It may be reclined to any position by simply touching stops placed in the arms in plain view where any one may see them, and there are no projecting ratchet arms or points to catch the clothes as in other reversible seats.

4th. The reversing may be controlled by the railroad company, as the seat can be locked at either side, without interfering with its reclining.

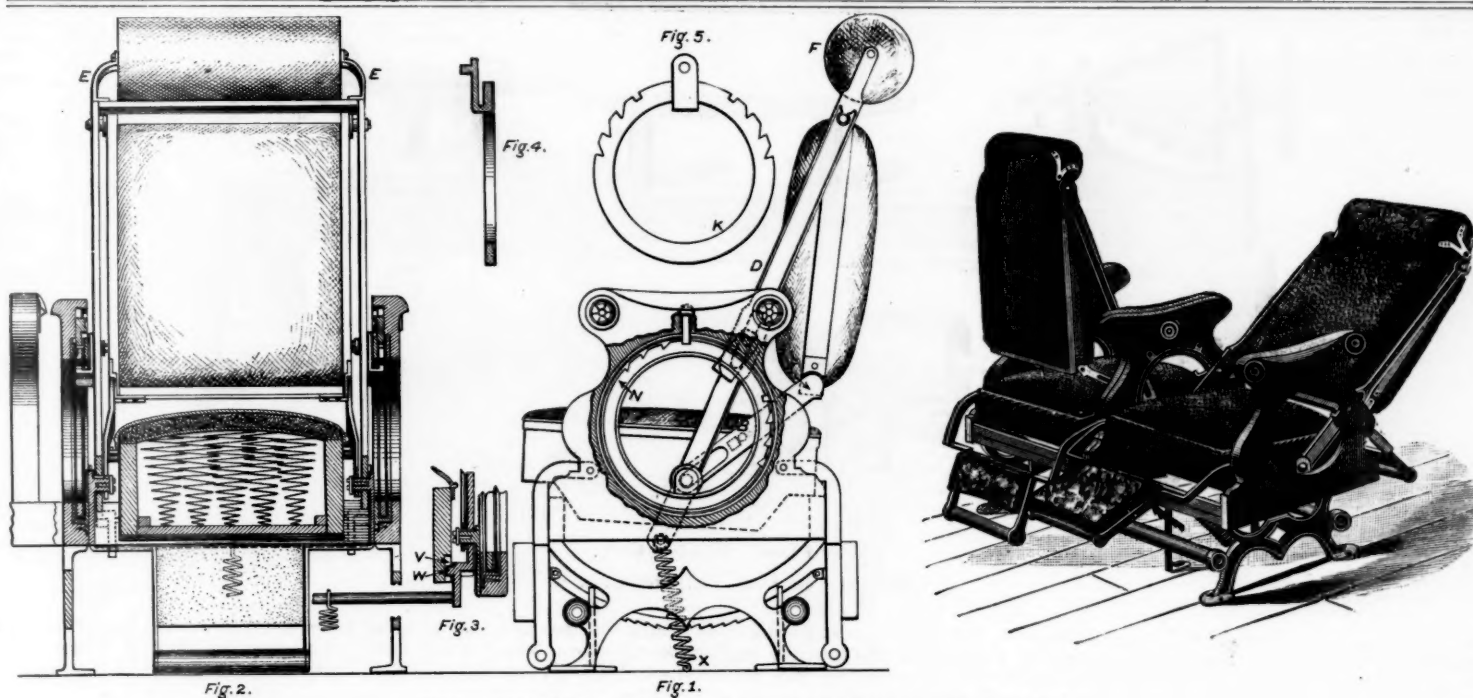
5th. When the seat is reclined a spring attached will cause it to return to its upright position by simply touching the stop and taking the pressure of the back from it.

6th. The width of the seat is 44 inches over all, giving within this space a centre arm and two seats with 20 inches between the arms.

7th. When the seat is reclined, the lower end of the back moves in to fit the body, thus making a much easier chair than the ordinary reclining chair; and the head-rest also rises as the back inclines, making a comfortable pillow.

8th. The method of moving the seat forward and upward as the back is reversed is simple, and instead of using 25 lbs.





THE EMMERT COACH AND RECLINING CAR SEAT.

Made by the JOHNSTON CAR SEAT CO., Chicago, Ill.

of castings to accomplish this purpose it is done with about 1 lb.

9th. The seat may be placed in 42-in. centres, and with its adjustable foot and leg-rest will make a comfortable and easy reclining chair.

10th. By leaving off the leg-rests and stopping the recline at one position these seats can be placed in the ordinary coaches in 36 in. centres, at about the same expense of the ordinary coach seat, thus giving the advantage of a separate reversible seat to each passenger.

The company also manufacture a single coach seat for two persons on the same principles.

The Chicago, Burlington & Quincy road has ordered this seat for eleven new coaches, and the Chicago & West Michigan has ordered this style of seat for four coaches.

#### Proposed Form of Annual Report.

The Inter-state Commerce Commission has submitted to the railroad companies for discussion and criticism a proposed form of annual report. The final form is to be issued a month hence. The information required is as follows:

**General Information.**—Name of common carrier; date and place of organization; location of offices; date of opening main line; name, length, title and date of acquisition of subsidiary lines, and other properties; names, addresses and terms of office of directors; date of annual meeting; number of stockholders; titles, names and location of office of all the general officers of the company.

**Capital.**—Number of shares, par and market value; total par value; amount issued and outstanding—for common and preferred stock both; nature of preferences; manner of issue, for cash, construction or reorganization; amount of capital per mile of road; various classes of bonds and obligations; their dates of issue and maturity; amounts authorized; amounts actually issued; cash realized; character of security and of interest payments; character of floating debt, for what incurred; its form, whether bills payable, vouchers, traffic balances or overdue interest and dividends.

**Permanent Improvements Charged to Capital Account.**—Itemized statement of construction and equipment expenses is required. Under each head are to be given charges for account of improvements, credits for property and material sold and the differences and net additions to property.

**Cost of Road and Equipment.**—An itemized statement is asked of the cost to the beginning of the fiscal year (June 30); the net additions during the year and the cost per mile.

**Income Account.**—Gross earnings, operating expenses, net earnings, income from other sources, itemized interest, itemized taxes, rentals and other expenditures, balance applicable to dividends, amount of dividends and surplus or deficit for the year. For roads under lease a shorter form is provided.

The analysis of earnings presents nothing unusual. The analysis of operating expenses is under the following heads: **Maintenance of Way and Structure.**—Repairs of roadway; renewals of rails (tons laid); renewals of ties (number laid); repairs of bridges, culverts, cattle-guards; repairs of fences, road crossings, signs; repairs of buildings; other expenses.

**Maintenance of Equipment.**—Locomotive repairs; repairs passenger cars; repairs freight cars; repairs barges, floats, tugs, ferry-boats, etc.; other expenses.

**Operating Expenses.**—Wages, locomotives; other trainmen; station agents (clerks and helpers); switchmen; flagmen; watchmen; fuel for locomotives; water supply; oil and waste; train supplies; station supplies; barges, floats, tugs, ferry-boats, etc. (expenses of, including wages, fuel and supplies); cars, rent of (balance only); telegraph maintenance and operating; other expenses.

**General Expenses.**—Salaries of officers; salaries of clerks; office expenses and supplies; agencies, including salaries and rent; commissions paid; expenses fast freight lines; expenses traffic associations; repayments to shippers—overcharges or other purposes (specified); advertising; insurance; loss and damage of freight and baggage; damage to cattle and property; injuries to persons; legal expenses; stationery and printing; other general expenses.

Under each of these items the amount chargeable to passenger traffic is to be separated from the amount to be chargeable to freight traffic.

Rentals are to be analyzed according to their form, whether in cash or guaranteed interest or dividends. The form prescribed for the general balance sheet presents nothing noteworthy.

Details of important changes during the year are asked for in blank; also a concise statement of all existing agreements connected with express companies, mails, sleeping car or dining room car companies, freight lines, other railroads, steamships, telegraph companies and others.

They also ask the number of employees of each class, from president down to laborer, with compensation, annual, monthly or daily; ordinary statistics of passenger traffic, freight traffic, train mileage, train loads and loaded and empty freight car mileage; detailed analysis of the tonnage of different commodities and the direction in which they are carried; various classes of equipment, numbers added during year and total at the end of year; weights and lengths of locomotives and tenders, maximum and average; average capacity of tender; number of locomotives equipped with train brakes and kind of brake used; maximum weight and carrying capacity of cars; length of cars, maximum and average; number fitted with train brakes or with coupler and platform.

**Description of Road.**—Miles constructed during the year, total owned or leased and total operated; length of main line or branches, single or double track, with location by states and termini; length of sidings on main line and branches; miles laid with iron, American or foreign; with steel, American or foreign, giving maximum and minimum weight per yard; amount and kind of cross-ties and ballast; details with regards to grades, alignment, bridges, tunnels, gauge of track, and telegraph ownership and operation.

#### Pennsylvania Railroad Relief Department.

##### ANNUAL REPORT.

The second annual report of the Voluntary Relief Department of the Pennsylvania Railroad has been issued by the Advisory Committee which, it will be remembered, consists of 12 members, one-half chosen by the members of the association and half appointed by the directors of the roads (all those of the Pennsylvania system east of Pittsburgh).

The report is accompanied by statements showing: 1. A general financial exhibit. 2. Financial exhibit by companies. 3. Analysis by companies of benefits paid. 4. Payments by the roads. 5. Number of benefits of each kind paid. 6. Membership record. 7. Auditors' report and statement. All these, except the last, cover both years 1886 and 1887. The association began operations Feb. 15, 1886.

The report proper is as follows:

Balance on hand Dec. 31, 1886.....	\$109,807
Contributions from members for year 1887.....	\$341,192
Interest on monthly balances.....	5,764
Receipts, year 1887.....	346,956
Total.....	\$456,763
Benefits paid members during year 1887.....	264,606
Balance Dec. 31, 1887.....	\$192,157
From which deduct as follows:	
Unpaid benefit orders.....	\$10,686
Unpaid death benefits—	
Cases of 1886.....	\$3,380
Cases of 1887.....	7,804
Estimated disbursement liabilities—	
Cases of 1886.....	\$443
Cases of 1887.....	40,289
Reserve for increasing ages of members.....	17,543
Estimated net surplus, Dec 31, 1887..	\$111,913

The number of payments and the amount of benefits paid under the several features during the past year, and for the period since the commencement of the department are shown in the following table:

BENEFITS PAID FROM FEB. 15, 1886.			
	No. of pay- ments.	Amount paid.	Average payment.
Death from accident.....	81	\$46,256	\$571.06
" " natural causes.....	314	185,717	591.45
Disablement from accidents.....	4,930	61,787	12.53
" " nat. causes.....	10,839	121,904	11.25
Total.....	16,164	415,754	

The auditors' report shows a balance to the credit of the fund of \$170,188, while the financial statement shows it as estimated at \$111,914, a difference of \$58,275. In the auditors' report there are deducted only those liabilities (\$21,969) the amounts of which are actually known; while in the financial statement there is an additional deduction of estimated liabilities representing payments yet to be made for existing disbursement cases (\$40,732), and the amount set aside for increasing ages of members (\$17,543), which, added together, make the sum of \$58,275, the difference stated.

The operating expenses of the department, paid by the railroad companies, were:

For the year 1886.....	\$54,509
1887.....	56,701
Total.....	\$111,210

It will be seen, therefore, that if the operating expenses had been a charge upon the fund, instead of being paid by the companies, the surplus, instead of being \$111,914, would have been but \$703.50.

The whole amount of payments by the companies thus far have been:

Operating expenses as above.....	\$111,210
Contributions for members in February, March and April, 1886.....	60,653
Additional relief in 1887 to members who had exhausted their title to sick benefits, as hereinafter stated.....	1,942
Total.....	\$173,805

The accessions to membership during 1887 averaged over 100 per month, and exceeded the deaths and withdrawals by 380. The number of members leaving the service (5,188), however, more than offset the gain of the accessions over the deaths and withdrawals. The average monthly membership for the year was 19,182. The death rate during the year was equal to 13 per 1,000 members, and the average number of members constantly disabled was equal to 28 per 1,000.

The changes in the regulations announced Oct. 1 have proved very acceptable. Those who, by the amendment to Regulation 42, were permitted to keep up their title to death benefit after ceasing to be entitled to disbursement benefits, have all availed themselves of the privilege. Under the provisions for continued payments by the companies to these members, there has been paid to 42 persons the sum of \$1,942.40.

Great interest was manifested by the members in the election held on Nov. 21, 1887, for selecting representatives for members of the Advisory Committee for the year 1888, as was evidenced by the numerous candidates, there being 168 voted for.

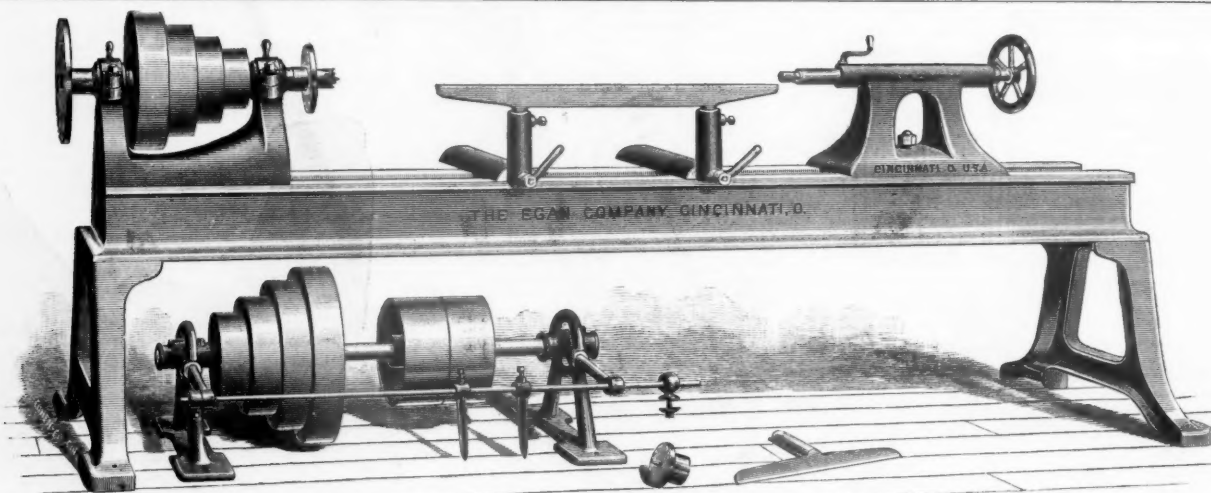
The number of votes cast was equal to 73 per cent. of the membership, and resulted in the election of the following: W. K. Beard, O. W. Coombs, H. K. Stout, L. D. Tufts, Geo. W. Cockley and J. H. Nichol. The members appointed by the boards of directors of the various companies to serve during 1888 are as follows: M. Riebenack, S. M. Prevost, R. Pitcairn, H. F. Kenney, Spencer Meade and A. O. Dayton.

It is a subject for congratulation that through the payment of the operating expenses by the companies the fund has realized so considerable a surplus, although it is too early in the history of the department to determine with any degree of certainty whether the present favorable condition can be depended upon as continuing in the future. It is extremely important, however, that there should always be sufficient surplus to meet demands which may arise from an extensive prevalence of disease, as well as from increasing liability to sickness and death as members grow older. The regulations provide, at the end of each period of three years, that the surplus, if there be any, shall be disposed of in promoting a superannuation fund, or in some other way, for the benefit of the members, and that if there should be a deficiency then existing, it shall be made up by the companies. The first period will terminate with the year 1888, when the question of proper disposition of any surplus on hand will be considered by the Advisory Committee. The active and earnest support received from the superintendent and his staff, both medical and clerical, in promoting the welfare of the department and the ability and intelligence exercised in the discharge of their respective duties, have met with the fullest approval of the committee.

#### The Blackshear Disaster.

On the morning of March 17 the Atlantic Coast fast mail train, south-bound, was derailed on the trestle  $1\frac{1}{2}$  miles from Blackshear, Ga., on the Savannah, Florida & Western, and nearly the whole train tipped off into the dry bed of the river, crushing the cars, killing 27 passengers and injuring





IRON FRAME WOOD LATHE.

Made by THE EGAN Co., Cincinnati, O.

some 35 more. The train consisted of engine, baggage car, 2 passenger cars, a Pullman sleeper and the private car of President Wilbur, of the Lehigh Valley. The tender was derailed 1,200 ft. before reaching the bridge, which consists of a bridge proper over Hurricane River and wooden trestle approaches at either end. The derailment seems not to have been promptly discovered, and the whole train passed over the bridge and trestle until the tender got within 90 ft. of the further abutment, where the derailed truck slewed around and tore up the sleepers. The tender broke loose from the engine and on reaching the abutment fell about 20 ft., the rest of the train following it. The only information we have concerning the speed of the train is the testimony of the porter of the sleeping car, who said it was 45 miles an hour. The officers of the road have found no evidence of a broken wheel or axle, and the track, which is of 60-lb. steel, shows no evidence of any defect. The testimony of the passengers goes to show that the cars, even the strongest of them, were completely crushed in, some of them falling upon others. Fire broke out but was soon extinguished by the prompt action of engineman Welsh who also is credited with flagging a following passenger train which was only 10 minutes behind. Assistance from the village came promptly. Among the killed was Merritt A. Wilbur, son of the president of the Lehigh Valley, and C. A. Fulton, master of transportation of the Brunswick & Western. Mr. Wilbur and his two other sons were injured, as were also Mr. and Mrs. George J. Gould, of New York. About half of the killed and injured were colored people.

While the wrecking crew were at work Sunday night a portion of the trestle fell, killing three of the men and injuring five others.

#### Iron Frame Wood Lathe.

We illustrate herewith an improved wood lathe with iron bed, which is specially designed for use in large pattern shops, car and railroad shops, and other establishments requiring a reliable and substantial tool for turning pieces of considerable length or large diameter.

The head stock spindle is made of the best crucible cast-steel and furnished with double face plates. The back plate is for turning large circles; a suitable floor-stand with an adjustable rest being provided for this purpose. This face plate can be taken off and the back step placed in position to sustain the thrust on the spindle when turning between the centres. The head stock has a cherry cone, with four steps of large diameter and face, in order to give ample belt power for all kinds of turning.

The tail stock has a crucible steel spindle and centre, which is worked in and out with a hand wheel and screw. An improved clamping device secures the spindle in any position required.

The bed is planed true and is provided with two sockets which are automatically tightened by an ingenious clamp device and can be clamped in any desired position across the bed. The cut represents a lathe with 10 ft. bed, with 24 in. heads, but the length of bed and size of heads can be varied to suit the purchaser.

Any further information can be obtained of the manufacturers, The Egan Company, Cincinnati, O.

#### Gold's Improved Trap for Continuous Steam Heating.

The accompanying engraving shows an improved form of trap lately devised by Mr. Edward G. Gold. The trap is shown as applied to a Gold coupler for continuous steam heating. The principle on which the trap acts differs from that of the majority of traps in use, which are thermostatic, or in other words, are operated by a fall in the temperature of the steam or water in that part of the pipes or coupling near the trap. When the temperature falls the trap opens, jetting out any condensed water, but the escape of hot steam again closes the trap. As generally arranged the contraction of a metal rod or of alcohol contained in a hermetically sealed case opens a valve, which permits the condensed water to escape.

This form of trap has been found in practice to occasion-

ally freeze up when the train is left all night with the engine detached. The cause may be explained as follows: When the steam is on the traps are closed and if in proper order prevent any escape of steam. As the steam cools the trap operates until the pressure in the pipes falls below the atmospheric pressure. In other words, a vacuum exists in the pipes and the pressure of the atmosphere consequently recloses the valve closed by pressing the disk of alcohol against its seat. The condensed water therefore cannot escape, and as the temperature continues to fall, the vacuum increases, keeping the valve tighter against its seat until the condensed water freezes.

The trap shown in the accompanying illustration is especially designed to overcome the difficulty above described. It is not operated by any change of temperature, but a fall in the pressure of the steam in the pipes.

When steam is first turned into the pipes, condensation ensues, and the condensed water escapes, the valve being in the position shown in the engraving. As the pipes become warm, the condensation diminishes, and the pressure rises, driving the valve downward and seating it. The spiral spring shown is very light and just overcomes the gravity of the valve, so that the latter opens when the pressure inside the pipes falls to the atmospheric pressure.

It is evident that this point will be reached before the condensed water can freeze, and it may therefore be expected that this valve will open and discharge all the water when the cars are left for any time disconnected from the engine.

The Gold coupler has been previously illustrated in these pages, and while the manner of coupling remains unaltered, some improvements have been made in the details. The arm *N* is now made of a somewhat stronger form. The method of securing the gasket *C* by means of a screwed bush *L* is clearly shown.

The method of securing the hose to the coupling is stated to give excellent results. The taper sleeve *K* is screwed directly on the rubber hose *J*, forcing it on the lugs *D*. This method appears to give ample security against a hose being blown off. It might be expected that the screw threads would

cut the rubber, but careful examination of hose that had been in use for some months shows that this is not the case.

#### Kalamazoo Section Hand Car.

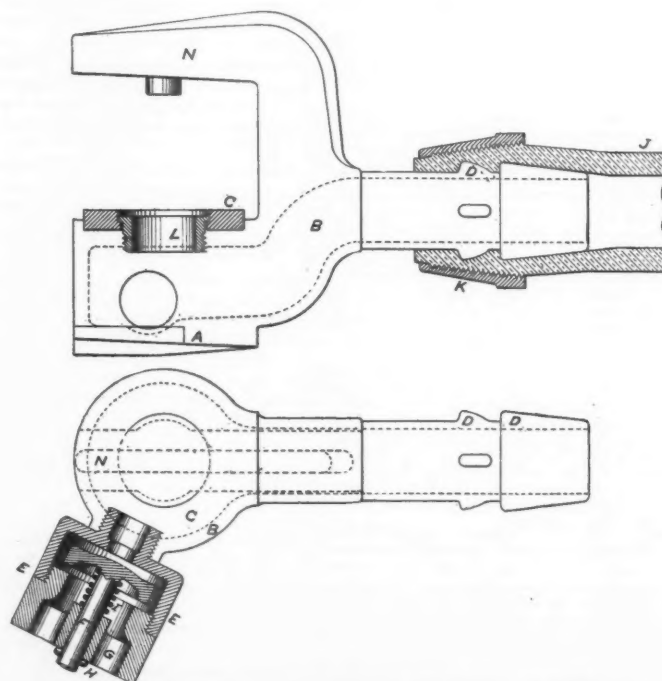
The accompanying illustration shows the Kalamazoo Section Hand Car, manufactured by the Kalamazoo Railroad Velocipede & Car Co., of Kalamazoo, Michigan. While the actual weight of this car is 525 lbs., many railroad men think it as light as is consistent with strength, durability and safety, and that they prefer this small additional weight of a car with matched oak decking, to one with pine or basswood decking.

The car illustrated above is constructed as follows:

The frame is made of thoroughly seasoned white oak, all woods gained; decking of matched oak, 6 ft. 4 in. long. The car is strongly trussed by four  $\frac{3}{4}$  in. cross truss rods, two at each end, and two  $\frac{7}{8}$  in. longitudinal truss rods. There are also four wooden braces running diagonally from each corner to centre, and bolted securely to the frame. The axles are of hard machinery steel, and all bearings of the best quality of brass, and all bolts jam nutted.

One of the most important features in the manufacture of a hand car is the wheel. The Kalamazoo Co. claims that, while the several wooden wheels in use the past few years are an improvement on the ordinary cast and wrought-iron spoke wheels, they are not durable, and will not stand exposure to all kinds of climate and weather; that the bolts work loose; that the wood will shrink and swell, and finally check, split and become useless. It is claimed that the above objections are entirely overcome in the improved "combination" wheel, which is described as follows:

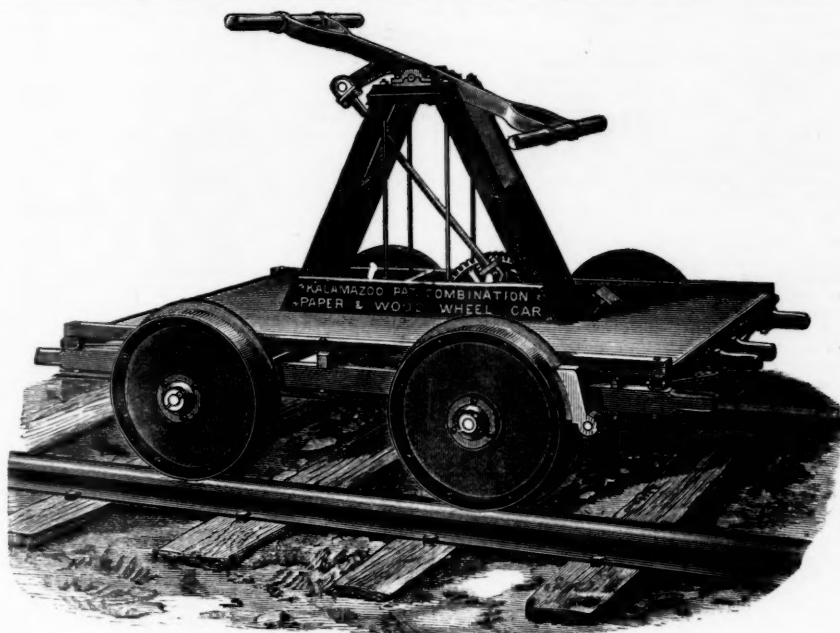
The rim is wrought steel, 20 in. in diameter,  $4\frac{1}{2}$  in. wide (before it is flanged) by  $\frac{3}{8}$  in. thick. The flange is turned in dies under a 2,400-lb. drop, and the wheel is perfectly round and uniform. The surface of the tread is ground on an emery machine. The centre is constructed of paper and wood in the following manner: Two disks are used for each wheel,  $\frac{3}{8}$  in. thick;  $\frac{1}{2}$  in. is of birch veneer, composed of two pieces  $\frac{1}{8}$  in. thick, with grains crossed, and  $\frac{1}{4}$  in. of com-



IMPROVED TRAP FOR CONTINUOUS STEAM HEATING.

Made by EDWARD E. GOLD &amp; Co., New York.





KALAMAZOO SECTION HAND CAR.

pressed tar board or paper,  $\frac{1}{8}$  in. on each side of the veneer. The paper is treated with a material that makes it absolutely waterproof. The two paper disks and one of wood are put under 100 tons pressure when hot, the wood being saturated with glue and the paper with the waterproofing; after remaining in the press until entirely dry, it is taken out and the disks are perfectly formed in concave shape and ready to be pressed into the steel rim, which has a malleable iron angle stop riveted to the outer edge with a ring on the opposite side, and bolted securely to angle stop through felly and disks. Between the two disks is a solid hard wood centre 6 in. in diameter by  $2\frac{3}{4}$  in. thick, and a  $1\frac{1}{4}$  in. by 1 in. bent felly, which forms a backing at the point of bearing. This leaves a circular air chamber of  $\frac{1}{8}$  in. from wood centre to felly, which makes the wheel very light and nearly noiseless when in motion. It is perfectly waterproof, and will not be affected by climatic changes. It has given entire satisfaction under very severe tests.

#### The Great Storm.

The storm of wind and snow last week proved fully as widespread and disastrous as the first reports indicated, and some roads were a full week or more in recovering from it. Northern New England did not suffer exceptionally, and trains within 15 miles of Boston were kept running, but otherwise the blockade was as complete as indicated last week. The newspapers have printed hundreds of columns of particulars and have made mention of a great many derailments which will never get into our record, because the accounts are too vague. The New York Central had six or eight trains stalled between New York and Yonkers; most or all of them were heated from the engine, and the heating systems acquitted themselves creditably, though the snow actually embedded the cars from the windows down. The two inner tracks in the Fourth Avenue tunnel and on the viaduct north of it were badly blocked, and an express train stood near 110th street from Monday morning till Thursday night, though the passengers got out on Tuesday. The Boston & Albany had a train, from which the engine had been detached, stalled within eight miles of Springfield for about 46 hours. It contained 160 passengers, whose necessities were relieved by a volunteer party of 40 men, who carried coal and provisions on their backs from the nearest village, two miles or more away. The conductor strove six hours to reach the nearest telegraph office, a third of a mile away, occupying 45 minutes going the last 70 feet. Many other train men in various places proved themselves heroes. Near Worcester, on the Boston & Albany, the engine of a steam-heated train, which left it and went for help, was unable to return, and the newspapers say that blankets for the passengers had to be carried from the city by horse power. A Shore Line express train was detained near Saybrook, Conn., 53 hours. The New York, New Haven & Hartford had about the hardest fight of all, the New York & New Haven division being blocked near Bridgeport until Friday noon. Many telegraph poles were blown down, lodging on the track, and one interlocking signal tower was demolished by the wind, killing a man. The Harlem division of the New York Central was nearly as badly off, and a snow-plow, pushed by five engines, was derailed in a huge drift near Amenia on Friday, killing five trainmen. A similar derailment on the Lehigh Valley, which killed three men, is referred to elsewhere; and fatalities occurred in several other places. Twelve engines were reported derailed or disabled at one time in the yard at New Haven and fourteen at New Brunswick, N. J. Live stock froze to death in large numbers on the Boston & Albany and elsewhere; at St. Johnsville, N. Y., 26 cars of hogs were unloaded and driven into the engine house. Reports about freight trains being covered out of sight at Indian Orchard, Mass., on the New York division of the Pennsylvania and at other places seem to be literally true. Many branch lines had to be neglected, and 75 miles of the Long Island road

were reported still blocked on Monday of this week. Among the trains derailed in the snow was the New York & Philadelphia "two-hour train" on the Central of New Jersey, which runs 70 miles an hour for a good portion of its trip.

The stoppage of trains on the Elevated roads in New York was primarily due to the density of the traffic; that is, the frequency of the trains and their heaviness as compared with the power of the engines. Although the snow—with some rain to make it sticky—accumulated very fast, the main track could have been kept clear simply by the passage of trains, if storms of this sort were at all common and had been expected. The shortening of the trains, or the addition of pushing engines, would have kept the road open. But with trains following each other so closely, a blockade of a half hour, or even less, at a single point sufficed to stop a score or two of other trains, and then their fate was settled, for several hours at least. At the terminal stations, where there are several parallel tracks and the platforms make the conditions somewhat similar to those in a large yard of a surface road, there was a large accumulation of snow, so that switches became clogged and nothing but an extra force of shovelers and sweepers could cope with the situation.

As a good many railroad men have had new experiences in the line of "snow-bucking," and as some of those who are older have had very unfortunate experiences in this storm, we print below the rules of the Northern Pacific for the guidance of its trainmen. It will be seen that running snow-plows is not regarded out there as boy's play by any means. It will be understood that these rules are for use with common plows not the rotary shovel.

#### INSTRUCTIONS TO BE OBSERVED IN CLEARING THE TRACK OF SNOW AND ICE.

When two or more engines are coupled together, the forward engines will (except in case of danger, when any engine will signal) be considered the signal engine, and the direction the forward engine is going will govern all others in the gang.

When starting for, or backing out of a snow-drift, the forward engineer will first place his lever in proper position, and then signal the other engines. The second engineer will answer the signal first given only when entirely ready to give his engine steam. The third engineer will answer the signal of the second engineer only when entirely ready to give his engine steam, etc. The last signal given will govern all engineers in giving steam to their engines, which must be done on the instant.

In case a following or assisting engine is employed, it will keep at least one-half mile in the rear of snow gang, and be prepared to move forward the instant required. Five blasts of the whistle is a signal for following engine to move forward to assist snow gang, and the signal should be answered by the same signal.

In case engines become fast in snow bank, it is best to shovel out one of them at a time, and clear the track of snow. The released engine then becomes a helper for the others.

In running for snow banks, engineers must in absence of express orders, as regards speed, use their best judgment, considering the condition of track and bank. When snow is badly packed and frozen, the edge of drift should be broken to allow plow to follow under with safety. In absence of an experienced conductor, head engineer will frequently examine snow banks before running, and especially when snow is deep or badly drifted upon one side of track.

It is useless to run into snow banks with low steam, and engineers will therefore pay particular attention to having full boiler pressure before making a run.

On regular snow-bucking expeditions the pilots of pushing engines must be removed, and engines thoroughly equipped with substantial drawheads, firmly bolted. Also an extra supply of links and pins, and the coal in the tender well covered with tarpaulin.

Snow-plows running ahead and on time of passenger trains will pull beyond the station building and await the arrival of the train before proceeding.

Everybody interested must understand that plow engines cannot use headlights, and that the shoe of the plow is liable to crowd torpedoes off the rail without exploding, and the frequent use of the injector in low temperature blinds the engineer by steam, thus requiring the greatest possible care in flagging plow engines.

In blizzards, when it is necessary to follow the plow closely engineers of following trains will allow as much time as pos-

sible between the plow and the following train. All engineers should mark the bad cuts, and in severe storms every precaution should be taken to ascertain if the plow engine is through the cut or has had time to get a flag back. Particular attention is called to this rule.

No man is worth anything in snow-plow gang who has not perfect confidence in himself, engine and plow. Any one who does not feel this is requested to inform his superior.

#### Uniform Excess Baggage Ticket.

The National Association of General Baggage Agents at a special meeting in St. Louis, March 6, adopted a form for an excess baggage ticket, which has been printed and sent to members. It is in the usual form, consisting of three coupons, each about  $2 \times 2\frac{1}{4}$  in. In sending baggage on which excess is collected this form answers for the check, one coupon being used on the strap and one given to the passenger as a duplicate; and in the case of a lot of several pieces on which excess is charged, this form can be used for one piece and ordinary checks for all the others. The advantages of the new form are set forth in the following circular of Secretary Quick:

"The points we have sought to cover are as follows: 1. Uniformity as to method of collecting and reporting foreign excess collections, which enable all to know what to expect from connections, and invites investigation in the absence of evidence of collection on baggage apparently liable to excess charges. 2. It is a combination excess baggage-strap and duplicate check and receipt, which insures the receipt being taken up at destination, and enables the terminal line to verify the weight and charges on which collection is made by initial line. 3. Intermediate lines can make record of weights and amounts passing over their line, and while this cannot always be done on train, it is possible to make the record at initial or terminal junction point if it is deemed advisable. 4. To give all necessary information for auditing departments. 5. A receipt that can be used for local as well as for foreign excess baggage, provided any line prefers but one set of excess blanks.

"It will be understood that any line adopting this form and retaining its essential features, can make such minor changes in the form, and add such supplementary instructions as may be desired.

#### Western Railway Club.

The club held its regular meeting on Wednesday, March 21. The first subject discussed was "Six-Wheel Trucks for Freight Cars," Mr. J. N. Barr (C., M. & St. P.) reading a paper on this topic. Mr. Barr said:

In designing an axle for freight cars of 60,000 lbs. capacity, considerable difficulty has been experienced in proportioning the different parts. The collarless axle proposed by Mr. Johann seems to meet the requirements as well as any, and perhaps better. But with this, as with all collarless journals, the end thrust of the axle is resisted by one side only of the trucks, and the consequent tendency to distortion of the trucks is very much greater than is the case with journals having end collars. Difficulty of this kind was experienced when collarless axles were first used in passenger car trucks, and it is not unreasonable to suppose that with the more frail construction of freight car trucks, together with the tendency to run freight car trucks in a more or less dilapidated condition, that the question of end thrust, confined to one side of the truck, may be worthy of serious consideration. This question should be fully settled by actual test before the construction can be fully indorsed. The proposition to simply increase the diameters of the different parts of the present M. C. B. axle until an increase of strength proportionate to the increased load is obtained, leads to several difficulties. It is difficult to accommodate the present standard box and brass to the increased diameters without reducing the collars, which, to say the least, would be very questionable practice. The increased diameter of the bore of the wheel is also objectionable. The proposition to increase the length of the journal to afford less frictional resistance will have a tendency to increase breakage of journals, and this seems to be manifesting itself now. In fact, I think the proper relation between the diameter and length of the journals should be as one to two, when worn out, and it should be almost impossible to obtain these proportions if journals are made 8 in. long. In view of the above, as well as of other considerations to be referred to further on, I have been led to believe that for cars of 60,000 lbs. capacity, or greater, a six-wheel truck should be used. This truck could be made somewhat after the pattern of the present diamond truck. The centre casting should be enlarged to take the box for the middle pair of wheels, the boxes should have an independent vertical movement in pedestals, and the weight should be transmitted from the frame through spiral springs to the boxes, the truck frame as a whole acting as an equalizer. Such a truck would have about the same relation to a 70,000-lb. load as the present standard four-wheel truck bears to a 40,000-lb. load, the present standard axle box and bearing being used. The objections to a truck as proposed above are, first, increased first cost, and second, increased resistance to traction. There do not seem to be any data to show just how important these objections may be. The arguments in favor of such a construction are numerous. First, it is very likely that a much smoother riding car would be obtained. This would have a beneficial effect on the entire structure. For some kinds of traffic, as live stock, an improvement in the motion of the car would be a decided advantage. Second, the increase in bearing surface would not be affected by increased velocity of the bearing surface, as in the case when the journal diameter is increased. Third, it is generally conceded that wheels under cars of 40,000 lbs. capacity are subjected to a service very nearly equal to their safe limit of strength. The addition of two more wheels will distribute the load of the heavier cars so that no heavier duty will be required of the wheels as a whole. This difficulty might be met to a certain extent by increasing the weight of the wheel. The increased pressure between the wheel and the rail, however, will, in four-wheel trucks, cause much more rapid wear in the wheels and possibly in the rails, and will also increase the effect of any flat spots or irregularities in the wheel or in the track. In the six-wheel truck the distribution of the load will have a tendency to reduce the causes of destruction just named. In the case of breakage of wheels or axles the tendency to derailment and extensive damage is very decidedly in favor of the six-wheel truck. In fact, with a good six-wheel truck the liability to derailment, in case of a broken wheel or axle, is not great, while with four-wheel trucks such breakage will almost certainly produce derailment. Taking everything into con-



sideration, the question of six-wheel trucks for 60,000-lb. freight cars is well worthy of attention.

In the discussion Mr. VERBRYCK (C., R. I. & P.), advocated the use of the M. C. B. standard axle and did not consider that the central support truck would be as handy as a six-wheel truck on account of the difficulty of getting at the same for repairs. He said that on his road they were having as much trouble with the collarless journal as with others. In passenger service six-wheel trucks were giving place to four-wheel trucks.

Mr. SINCLAIR favored the four-wheel truck, because in first cost, maintenance and hauling it was cheaper, the shorter wheel base being preferable.

President RHODES suggested that lessons might be gained by experience in the passenger service, where six-wheel trucks are largely used. Regarding the collarless journal, he said good results had been obtained on the Burlington, and he believed that the journal should be made larger, so that the weight per square inch would be less and the lubrication better.

Mr. HICKEY (M., L. S. & W.) understood that Mr. Barr discouraged the collarless journal. The speaker favored it. Mr. COOK (C. & E. I.) agreed with Mr. Barr that collarless journals make trouble.

C. H. SCHROYER (C. & N. W.) believed that the resistance was greater on six-wheel trucks than on four-wheel, and that wear and tear would be increased; there were more slid wheels under six-wheel trucks than under four-wheel trucks, which he considered an important thing.

Mr. SNOW (Illinois Central) said that he was doing away with the six-wheel trucks on passenger cars wherever possible.

#### WEAR OF LOCOMOTIVE TIRES.

JOHN MACKENZIE (N. Y., C. & St. L.), who had prepared a paper on this subject not being present, it was read by the Secretary. A blue print was presented showing the results. One fact brought out is that the wear after the second three months after turning is much less than the first three months after turning; in other words, the tire wears much faster after turning than after it has been in service two or three months. The blue print shows a bad distribution of weight of drivers, the two rear drivers wearing very much faster than the front ones. The present condition of the tires shows that the front tires are  $\frac{3}{8}$  in. larger in diameter than the rear ones, as was also shown when the tires were turned the first time. I should say this engine is equipped with driver brakes on the two rear wheels, which will account for some of the wear, and credit the wear by weight. In regard to durability of thick tires as compared with thin tires, few cars have been had from the thick tires in use, and very little information is obtainable. One case can be cited. A set of tires,  $\frac{4}{8}$  in. thick, placed on a switching engine, compared with an engine with tires  $\frac{2}{8}$  in. thick, the mileage for the thick tires was from 5,600 to 7,800 miles per  $\frac{1}{8}$  in. of wear; that is, the first card for six months showed 5,600 miles per  $\frac{1}{8}$  in. of wear, and the second card for four months showed 7,800 miles per  $\frac{1}{8}$  in. of wear. The card on the lighter tire ( $\frac{2}{8}$  in.) for eight months showed 4,800 miles per  $\frac{1}{8}$  in. of wear. This may not carry out in all cases, but as far as may be judged now the heavy tires will give a better wear than lighter ones. Particularly is this the case with over cylindered engines. In both cases the engines were four-wheeled switchers, with wheel centres 42 in. diameter and in the same yard. The conditions are similar.

Mr. RHODES thought that better results would be attained proportionately by using 3-in. rather than the 4-in. tire.

Mr. SMART (Mich. Cent.) could not understand what was to be gained by using 4-in. tires.

Mr. GIBBS (C., M. & St. P.) considered that it was a question of the material of which the tires were made.

Mr. FOSTER (C., R. I. & P.) thought it an error to base any argument upon the records of only two engines. There should be a more general test before deducting conclusions.

#### TECHNICAL.

##### Locomotive Building.

The Grant Locomotive Works, Paterson, N. J., contemplate extensive enlargement of their entire works—machine shops, foundry, boiler, and blacksmith shops.

The Baldwin Locomotive Works has nearly completed its order for 15 locomotives for the Louisville & Nashville.

##### Car Notes.

The Connoton Valley is having 800 coal cars of 25 tons capacity built by Pennock Bros., Minerva, O. They are to be delivered in June.

The Lafayette Car-Works, Lafayette, Ind., have contracted for the building of 3,000 cars so far this year. Of this number 1,500 are for the Chicago, Burlington & Northern, 750 for the Duluth, South Shore & Atlantic, 200 for the Lake Erie & Western, 100 for the Buffalo, Rochester & Pittsburgh, and 300 for the Chicago & Indiana Coal.

The Eastern Minnesota has ordered 1,250 freight cars of the Michigan Car Co., Detroit, Mich.

The Kansas City, Memphis & Birmingham has ordered 50 freight cars from the St. Charles Car Co., St. Charles, Mo.

The Ohio Falls Car Co. has contracts on hand for the building of 102 passenger cars, to be delivered within the next six months.

The Indianapolis Car Co. has contracts to build 600 cars for the Atchison, Topeka & Santa Fe, 200 for the Cleveland, Columbus, Cincinnati & Indianapolis, 200 for the Pittsburgh & Western, and 225 for the Louisville Southern.

It is reported that Bay County, Mich., will spend about \$75,000 in erecting new bridges.

The Board of Estimate and Apportionment of New York City has authorized the issue of \$250,000 for the completion of the new bridge over the Harlem River now in course of construction.

The County Commissioners of Independence, Mo., will build an iron bridge, 165 ft. span, at Big Blue, Mo. Address F. H. Grinter, County Surveyor.

It is reported that the New York, Providence & Boston has decided upon the plans for the bridge across the Thames River from New London, Conn., to Groton.

The Paducah & Illinois Bridge Co. and the Barbourville & Cumberland River Bridge Co. have been incorporated by the Kentucky Legislature.

The Pittsburgh, Cincinnati & St. Louis will build a bridge over the Ohio at Steubenville, Pa.

The Chicago, Milwaukee & St. Paul will build a bridge at Chamberlain, Dak.

A bridge will be built over the Passaic River at Harrison, N. J., by the Commissioners of Hudson and Essex counties. A bridge will be built cross the Cuyahoga River at Cleveland, O.

The contract for building the approaches to the Breckenridge street bridge, at Louisville, Ky., has been let to the Louisville Bridge & Iron Co. at \$12,100.

The Atlanta Bridge & Axle Co., of Atlanta, has contracted to build six bridges along the Covington & Macon.

##### Bridge Notes.

The Halifax River Bridge & Street [Railway Co. has been

organized at Daytona, Fla., with a capital stock of \$10,000, by H. P. Hand and others.

The Wabasha Bridge & Ferry Co. has been incorporated by M. A. Odrick and others, of Wabasha, Minn., to build a bridge across the Mississippi. Capital stock \$20,000.

The Decatur Iron Bridge & Construction Co. has contracted to build four iron bridges on the Chattanooga, Rome & Carrollton, at a cost of about \$35,000.

The County Commissioners will build a two-span iron bridge over White River, near North Indianapolis, Ind.

The San Francisco Bridge Co. has completed the bridge across the Mojave River at Dagget, Cal.

The County Commissioners will build a bridge across the Platte River, near Denver, Col.

The County Commissioners, Hamilton, O., will build a bridge across the Miami River at a cost of about \$30,000.

The King Iron Bridge & Manufacturing Co., of Cleveland, O., have contracted to build an iron bridge across the Mernac River, near Moselle, Mo.

##### Car Heating Notes.

A train on the New York, Chicago & St. Louis (Nickel Plate) has been fitted with the system of continuous heating introduced by the Erie Car Heating Co., of Erie, Pa. The results of a trial are said to have been very satisfactory. This system has also been recently applied to trains on the Lake Shore & Michigan and West Shore.

##### Manufacturing and Business.

Messrs. Bryam & Co., of Detroit, Mich., manufacturers of the "Colliau Cupola," have recently placed the fifth furnace of their manufacture in the works of the Jackson & Woodin Manufacturing Co., Berwick, Pa.

The Westinghouse Electric Co., of Pittsburgh, Pa., has completed an incandescent lamp, which, it is stated, will burn easily from 2,500 to 3,000 hours. They have also been awarded the contract for furnishing New Bedford, Mass., with a 2,000-light plant.

The Johnston Car Seat Co. are the manufacturers of the Emmert car seat, and began business but a few weeks since. Their office is at Club Room 5, Grand Pacific Hotel, Chicago. Mr. E. N. Gillilan, formerly of the Streater Reclining Car Co., represents the new corporation, and Mr. W. S. Brewster is also their agent. James P. Johnston is President, and J. S. Emmert Secretary.

The St. Louis Car Wheel Co. has elected John H. Bass, President; John I. White, Vice-President, and R. W. Green, Secretary.

The Niles Tool Works, Hamilton, O., have shipped a carload of machinery for the new shops of the Alabama Great Northwest.

The Omaha Car Heating Company, with a capital of \$20,000, has been organized to purchase and work certain patents of William G. MacLaughlin. The principal place of business of the company will be Seward, Neb., and its projectors are Claudius Jones, W. G. MacLaughlin and H. T. Jones. The same parties have filed articles of the MacLaughlin Chemical Motor and Heating Company, which also starts out with a capital stock of \$20,000 and is located in Seward.

Messrs. Merchant & Co., of Philadelphia, importers and dealers in metals, have recently moved into a new building on Arch street, built expressly for them. The building is 25 x 290 ft., and the first floor and basement have railroad tracks, switches and turnouts for the handling of the metals, while the second floor is used exclusively for office purposes. The change was made necessary on account of the large increase in their business. They make a specialty of imported roofing plates, and are also sole agents for the Star Ventilator.

The Toledo Foundry & Machine Co. has recently made a contract with the Pennsylvania for a second Victor excavator of the largest size, capacity of eight yards per minute. The same company has lately sold one of its pitless turntables to the Mobile & Ohio for the Mobile terminus, and has an order from Germany for one of Stock's patent railroad velocipedes. They report orders and inquiries from various parts of South America as well as from Europe.

##### Iron and Steel.

The Cincinnati Forge & Iron Co. of Cincinnati, Ohio, will rebuild its works, which were destroyed by fire last November, on a larger scale.

A rolling mill for turning out railroad iron is projected at the Flat Shoal depot, N. C., of the Cape Fear & Yadkin Valley.

The South Chicago works of the North Chicago Rolling Mill Co. are now in full operation, with the exception of one blast-furnace.

The Sagendorf Iron Roofing & Corrugating Co. of Cincinnati, made an assignment to Harlan P. Lloyd on the 13th inst. It is expected that the company will be able to resume business.

A. E. McClure, Jacksonville, Fla., wants prices of light iron rails.

A furnace for heating old rails is being erected by the Hubbard Iron Co. at its mill at Youngstown, O.

The rolling-mill of P. L. Kimberly & Co., at Sharon, Pa., has been closed down for the present. The Greenville mill of this company closed at the same time.

The product of the blast furnace of the Bellaire Nail Works for December, January and February was 14,021 tons of Bessemer.

The Crane Iron Co., at Catasauqua, Pa., put in blast its No. 6 furnace last week.

The rolling mill of the Kittanning Iron Co., Limited, at Kittanning, Pa., has been closed down for an indefinite period.

The Pennsylvania Iron & Coal Co., at Canal Dover, O., is just completing a new hot-blast oven of the Pollock pattern. The Globe Rolling Mill Co. of Cincinnati, is engaged in constructing a 60-ton double reversible Smith furnace.

The Consolidated Wellston Coal & Iron Co. has purchased the Milton Furnace now in operation in the limits of Wellston. The company will erect during the year additional furnaces and a steel plant in which the molten metal will be rolled into wire without reheating.

The charter of the Allegheny Bessemer Steel Co. was filed in Pennsylvania last week. The capital stock is held by Edward L. Clark, D. E. Park, R. B. Brown, George Boulton and others.

The Moorhead McCleane Co., of the Sobo Mills, Pittsburgh, will make extensive improvements in their blast furnace. The contract has been given to Riter & Conley, the figure being \$45,000, the Moorhead-McCleane Co. to furnish all material.

The Cincinnati Iron & Steel Co., of Cincinnati, has been incorporated, with a capital stock of \$100,000.

##### The Rail Market.

Steel Rails.—Ordinary sections are quoted at \$31.50 to \$32 at the mill. There are several inquiries in the market but little actual business has been done lately. The eastern mills, however, are well supplied with orders for spring delivery, and it is reported that large orders have lately been placed with western mills.

Old Rails.—T's are quoted at \$21.25 to \$21.50 f. o. b. New York.

Rail Fastenings.—Spikes, 2.10 to 2.15c.; bolts, 2.9 to 3c.; splice-bars 1.95 to 2c.

##### Brake Notes.

The Westinghouse improved freight brake is being applied to some stock cars on the Terre Haute & Indianapolis (Vandalia line).

The Southern Pacific Co. are changing the brakes on their passenger equipment from the plain to the latest form of automatic brake.

##### The Transcaspian Railroad.

A Russian official paper published in Turkestan announces that the Transcaspian Railroad will be completed by May 15 of this year as far as Samarkand. The earth work on the line is almost completed, and only two fairly large bridges over the Narupai Canal remain to be completed.

##### Increase of Adhesion by Electric Current.

On the 20th inst. patents were issued to Mr. Elias E. Ries, of Baltimore, for new methods and apparatus for increasing the tractive power of motors by the use of electricity. This method was the subject of a paper read before the American Association for the Advancement of Science at its last meeting, an abstract of which was given in the *Railroad Gazette* Aug. 19, 1887. It is stated that experiments have shown that by this method the co-efficient of friction between the wheels and track can be increased from 50 to 100 per cent., and the inventor claims that in wet weather or with ice covered tracks the difference in favor of the electrical appliance over mere mechanical friction due to weight is still greater.

##### The State Railroad Question in Switzerland.

It is stated that a special commission of the Federal Government has offered to purchase all the common stock at par, and the preferred stock at an advance of 20 per cent. of the North-eastern, one of the largest, if not the largest of the Swiss railroad companies. As this stock has not been very remunerative in dividends, the company makes, of course, little objection, and no difficulty will be experienced to obtain the consent of all the stockholders. As, however, the purchase by the government would have to be first ratified by a popular vote, some doubts are entertained about its being accomplished, the price offered being considered too high, the purchase being in the interest of a few localities, while no improvement on the existing service could be expected by the change.

##### THE SCRAP HEAP.

##### New North River Ferry Boat.

It is said that a steel ferry boat, with screws fore and aft is to be built for the Hoboken Land & Improvement Co., North River. As the engines can go below deck space usually occupied by the paddle boxes is saved. The propeller is faster, can make better headway against floating ice, and is less liable to injury from drifting logs. The new boat will be 200 ft. long and 37 ft. beam, with powerful engines, and will cost about \$100,000. If she proves to be a success others are to be built and the old ferry boats will be altered to the new model.

##### A Wind Screen for Trains.

During an exceptionally heavy gale a passenger train in New Zealand was blown over an embankment, the engine alone remaining on the rails. Two passengers were injured, and a number of cars were smashed. The accident took place at the foot of the Rimutaka incline, on which a few years ago a similar accident happened, five persons being killed and a number injured. In order to prevent a recurrence of such a disaster, a very strong palisade was erected to break the strength of the wind, which, when blowing in certain directions, rushes down the steep and narrow gorge, in which the line is constructed, with terrific force.

##### Transporting Live Fish by Rail.

Two Danish engineers, Messrs. Ludt and Steenberg, have constructed a car to convey fish alive by rail without the number of dying and dead fish rendering the undertaking unprofitable. The car consists of two square iron tanks mounted on a specially constructed truck, the salt water being kept fresh by a circulating pump deriving its supply from a tender. All excrement and sediment can also be easily removed, while by another apparatus a uniform temperature is maintained in winter as well as summer. Some experiments with these cars have proved highly satisfactory, and the inventors maintain that they can forward live fish 200 to 300 miles by rail with only a minimum loss by death. They have also obtained a patent for their invention in Germany, where the transport of live fish from the coast to the inland towns is attracting much attention.

##### Pullman Cars in Sweden.

The first Pullman cars made in Sweden have just been built at the Kockum Engineering Works, at Malmo, for the Gothenburg-Helsingborg Railway. Each car is 50 ft. in length and 10 ft. in width, carried on two four-wheel trucks. The under frames are made of light steel plates. First, second, and third class cars are also being turned out, the latter seating 80 passengers. All the cars are fitted with every modern appurtenance, including continuous steam heating and electric light throughout.

##### The Poetical Aspect of Car-Heating.

Our esteemed contemporary the *Nor-Nor-Western Daily Blizzard* and *General Scourer* again bursts into Spring poetry on the car-heating question:

In the midst of the howling blizzard that was roaring throughout Southern Florida and instilling its icy presence through every conceivably small crevice, the stoves were removed from the passenger train which left Tampa for Key West, saving one in the baggage car to be used in an extremity, and the train was started with a temperature entrusted to the tender mercies of a comparatively untried steam heater, built by the West Indies Sangaree & Ice Melting Co., limited. The shrill winds whistled and played fantastically about the cars, making divers dashing assaults upon the flying train, but the combined attacks of the infuriated elements, wind, cold and snow, were powerless against the even and comforting heat within. It was a magnificent test, and amply illustrates that there is no dearth of safe steam heating appliances.

##### The New Steel Gun.

The solid steel gun now being made by the Pittsburgh Steel Casting Co. is nearly completed and will shortly be sent to Washington to be rifled, etc., for the firing tests at Annapolis. Recent tests on portions taken from the breech and muzzle of the gun show an ultimate tensile strength of from 81,420 to 92,500 lbs. per sq. in. in test pieces taken from different parts of the gun. Similarly the elastic limit varied from 40,790 to 50,000 lbs., the elongation in 2 in. from 10 to 27 per cent., and the reduction of area from 10 to 45 per cent. These results were considered very satisfactory and in excess of the government requirements.

The finished length of the gun will be 193.53 in.; the total weight of the metal, 18,490 lbs.

##### Enginemmen on the Burlington.

The *Railway Review* gives the following account of the methods of the Chicago, Burlington & Quincy in dealing



with the new men engaged in place of the striking locomotive runners:

"Upon arrival at Chicago they are taken before examiners who ask a short series of questions, simple, but of such a nature that the possession or lack of a proper knowledge of a locomotive on the part of the applicant is quickly revealed. If passing this scrutiny, the men are then sent out to division points, where they are put through the regular form of examination which the road always employs, which embraces some 300 questions. Any incompetents, who, by any mischance, have slipped through the first sifting process, are here surely caught. After careful instruction in rules peculiar to the Burlington system, the men who have passed examination are given work to do, but not till then. Many excellent men are found to be entirely unfamiliar with, or to have deficient knowledge of automatic air brakes. These are sent to Aurora, where they are carefully taught, in the air brake instruction car, the principles of construction, action and manipulation of automatic air brakes. These men are not hurried. A hotel is fitted up in one of the shops, with dining-room, bath rooms, and barber chairs; three dining cars with their cooks supply the eatables; a laundry service is also supplied. So the men are kept comfortably and contented, and freed from the possible annoyances of meeting with Brotherhood men and their town sympathizers—all this solely for the purpose of taking plenty of time in the air-brake instructions. No man goes into service until competent mechanical authority deems him a perfectly safe man to place in charge of an engine. Any other policy would be suicidal. The road could not, for obvious reasons, play more directly or more surely into the hands of the Brotherhood than by employing incompetent men."

#### A Tropical Joke.

The snow must have been very deep in New York to stop the elevated roads from running.—*New Orleans Picayune.*

#### Humors of the Storm.

A train which was unable, with the aid of two engines, to get out of the station at Springfield, Mass., for two days was occupied by some of the passengers as lodging quarters. Jeering boys outside were troublesome, so the passengers philosophically amused them by jokes in return. One placard which they hung out read:

"Drop a nickel in the slot and see the train move."

#### Stolen Tickets.

For some time past the officers of the Manhattan elevated road of New York have found improperly numbered tickets in the receiving boxes. This week it was discovered that the fraud was perpetrated by two boys employed by an engraving company, which formerly printed the tickets for the road. When the contract expired, there were some tickets left over and these were intrusted to one of the boys in the establishment to destroy. He, however, abstracted packages of them and passed them to his confederate, who succeeded in concealing them.

#### "From Lands of Snow to Lands of Sun."

Lute-voiced and siren-like and borne upon the wings of the blizzard comes the following announcement, dated St. Paul, Minn., March 17: "President Hill, of the Manitoba, is making arrangements to enter Southern California, and contracts for the right of way are being made. From Great Falls, M. T., the route will be over the Montana Central to Helena, thence southwest to the Utah & Northern. This will make only about 300 miles of road to be constructed to reach Los Angeles." This makes up in length what it lacks in breadth.

### RAILROAD LAW—NOTES OF DECISIONS.

#### Powers, Liabilities and Regulation of Railroads.

In New York the Court of Appeals holds that a construction company has no implied power to bind the railroad company for extra work not mentioned or embraced in the contract between the railroad and the construction company, and the fact that the railroad takes possession of the work done and has the benefit of it does not render it liable to pay for it. The case is not altered by the circumstance that the engineers of the construction company were also agents of the railroad company. But the Court is also of the opinion that under a railroad construction contract, binding the contractor to make "all the excavations or embankments connected with or incident to the construction of the railroad," if, after a cutting was made, the side caved in, the contractor would be obliged to excavate and remove the earth at the contract prices, and that such work would not be "extra work."

In Maryland a contract for the construction of certain railroad bridges reserved the right to the railroad company to make additions to or deductions from the work specified, at the same proportional amount of increase or decrease in pay as the whole amount bore to the original plan, provided that no alteration should be made which should entail upon the contractor an expense beyond the proportion of the balance of the work; and it was agreed that in the event of a difference between the parties "in regard to any part of the work done under this contract," the decision of the company's engineer should be conclusive. The Court of Appeals decides that under this contract the company had the right to make alterations, provided a more costly class of work than originally contemplated was not required; that the question as to whether certain alterations were within the contract was a question of fact for a jury to decide; that if they were within the scope of the contract, then the decision of the company's engineer as to the amount due the contractor therefor was conclusive, but if they were not, then the decision of the engineer was not conclusive (because it was only in regard to work done under the contract that his decision was to be conclusive), and the contractor was entitled to a fair compensation for the increased cost of construction by reason of the alterations.<sup>1</sup>

In New York the Court of Appeals decides that where the grantor of a right of way to a railroad company accepted, as consideration therefor, stock of the company and received a certificate for such stock made out in his name, and thereafter returned such certificate to the company and transferred the stock on the books of the company to his infant children, and requested the company to make out new certificates in the names of such children, which was done—a return of these certificates to the company by such grantor was not sufficient to enable him to rescind his conveyance of the right of way.<sup>2</sup>

The first section of the Nebraska act to regulate railroads and prevent unjust discrimination, and creating a board of transportation, etc., requires charges by railroads to be reasonable and just, and prohibits unlawful and unreasonable charges. The Supreme Court of Nebraska has just decided that where the State Board of Transportation finds that the charges of a line of railroad are not reasonable and just, and orders a reduction of such rates 33 1/3 per cent, such board cannot enter into a compromise with the railroad companies by which the charges within the state shall be in excess of the rates found to be reasonable and just in consideration of certain reductions in rates on in and out freight to and from Chicago and other common points.<sup>3</sup>

In Minnesota the Supreme Court rules that the St. Paul &

Duluth having acquired all property, privileges, and franchises, including the corporate franchise of the Lake Superior & Mississippi, is its successor in interest in condemnation proceedings begun by that company, and is authorized to complete the same.<sup>4</sup>

The Supreme Court of Nebraska decides that under the constitution of that state (Art. 11, Sec. 8) no foreign railroad company doing business in that state can exercise the right of eminent domain, or have power to acquire right of way over real estate for depot or other uses, unless organized as a corporation under the laws of that state. Any proceedings instituted by a foreign railroad corporation to exercise the right of eminent domain in the condemnation of real estate for the purpose of right of way are void, and, even if prosecuted to a termination, can confer no rights to such real estate upon such corporation. In such case, as soon as it is made to appear that the corporation is not incorporated "pursuant to and in accordance with the laws of that state," it is the duty of the Court wherein the proceeding is pending to dismiss the same for want of jurisdiction. Hence any order removing such a cause from the State Court to the Federal Court is void.<sup>5</sup>

In Georgia the Supreme Court rules that parol evidence of a verbal agreement that the defendant's railroad should be constructed through the plaintiff's land, in a particular way, is inadmissible to vary the terms of a subsequent written agreement by which plaintiff had agreed that, if the survey of the road should run through his land, he would give the right of way through the same for 30 ft.<sup>6</sup>

The Supreme Court of North Carolina rules that the section of the code (§ 1966) imposing a penalty upon railroad companies operated in the state, for discrimination in freight charges, does not apply to freight transported to other states, and the penalty imposed by that section is not incurred by a violation by the company of its provisions in transporting this class of freight.<sup>7</sup>

A South Carolina Act of 1852 provided that it shall be lawful for the South Carolina R. Co. to construct a bridge over the Congaree River, where it is intersected by the railroad, although the said bridge be not of sufficient elevation to permit steamboats to pass without lowering their smokestacks; provided that the said bridge be at least 42 ft. above the bed of the river, etc. The Supreme Court holds that the condition as to the height of the bridge was a continuing one, and not confined to the point of time when the bridge was constructed; and where it appeared that the bed of the river had been slowly but constantly rising, so that defendant's bridge was no longer at the required height, such structure was unlawful as long as the required height above the shifting bed was not preserved. But the Court said conceding that the proviso was not continuing, it appearing that the first bridge constructed in 1852 was washed away, and defendant's present bridge was built in 1867, and it not being shown that this was 42 ft. above the bed of the river though at the same grade, or above it, as the first bridge erected, the condition of the act was not complied with.<sup>8</sup>

#### Carriage of Goods and Injuries to Property.

In Mississippi the plaintiff's mule was killed at a railroad crossing. The engineer in charge of defendant's locomotive saw the animal when 30 or 40 ft. away, running to the crossing, but no alarm was given, nor any effort made to stop the train, which consisted of but one or two cars. The Supreme Court holds that plaintiff was entitled to recover.<sup>9</sup>

A statute of that state provides that before sale a mortgagor shall be deemed owner of the mortgaged property. The Supreme Court rules that it is no defense to a suit against a railroad company for killing stock in the mortgagor's possession that the stock was mortgaged, and the mortgage forfeited at the time of the killing.<sup>10</sup>

In Alabama in a stock killing case the Supreme Court says that an engineer in charge of a train is required to maintain a steady lookout for obstructions on the track, and to use all proper means to prevent accidents, when an obstruction is discovered; but something must be intrusted to his prudent discretion in a sudden emergency, and infallibility is neither required nor expected. If a proper lookout for obstructions was kept, and the animal killed was, when discovered on the track, so near to the engine that the accident could not be prevented by the prompt use of all proper appliances, the presumption of negligence is overcome, and no liability for damages is incurred; nor can negligence be imputed to the engineer as matter of law, because he did not sound the cattle alarm, if he promptly signaled the brakemen, and could not at the same time sound the cattle alarm; but the sufficiency of this excuse for such failure, as disclosed by the facts in evidence, is a question for the jury.<sup>11</sup>

In Massachusetts the Supreme Judicial Court decides that the statutory action for damages caused by sparks escaping from locomotives is not a penal one. It is an action not of contract but of tort.<sup>12</sup>

In Maryland the Court of Appeals decides that if a railroad company erects an obstruction to the flow of surface water, or closes a pre-existing outlet therefor, or changes the drainage, he must provide a proper outlet or culvert to carry off the flow of water, so that it may not be accumulated on the upper and adjacent lands of other persons, and so that no damage may result to contiguous property. Such outlet or culvert must be of ample capacity to carry off all the water likely to be in it; but no responsibility will be incurred for damages caused by extraordinary and excessive rainfalls and floods, the results of which could not be foreseen.<sup>13</sup>

In Minnesota the Supreme Court rules that for the neglect of a railroad company to fence its track as required by statute, the land-owner over whose farm the same is laid may recover as damages diminution of the rental value of the farm caused thereby. Nor are such damages to be limited to what it would cost to build a fence. "The statute," the Court says, "absolutely imposes that duty upon the railroad company, and declares its responsibility in case of neglect. This being so, it is inconsistent to say that upon default of the company it becomes in any sense the duty of the land owner towards the company to construct the fence in its stead. But again, when can it be said that the land owner ought to construct the fence? Is he to assume that the railroad company will continually neglect to do what the statute continually requires it to do, and so must he construct the fence at all? So long, at least, as he is justified in waiting for the company to do its duty, he may suffer damage from being prevented from using his land, or in the loss of its rental value; and if he were then to build a fence, this loss would be a proper subject of recovery, in addition to the proper cost of the fence."<sup>14</sup>

In Wisconsin, in an action for damages caused by a nuisance consisting of a railroad bridge across the bed and channel of a navigable river, and for its abatement, the plaintiff alleged that he is compelled to pass almost daily between two points on the river, and that, during the season of navigation, he would almost daily pass up and down the river in a steamboat owned by him, carrying himself and other passengers between the two cities, if it were not for the obstruction caused by the bridge, but is prevented from using his steamboat for that purpose, unless he uses a circuitous route, which increases the distance about four miles, and by which he is delayed in passing a lock in the government canal; and that his freight, in which he is largely interested as a manufacturer, has to be carried the same distance further than it otherwise would, or be carried by railroad at a much greater expense.

The Supreme Court holds that this shows no damage to plaintiff which is not suffered by the whole public who may navigate or desire to navigate the river; that the remedy is, therefore, by indictment for nuisance at the suit of the people, and a private action for damages will not lie.<sup>15</sup>

#### Injuries to Passengers, Employees and Strangers.

In Louisiana a number of young girls who were accustomed to play in the neighborhood of a depot went on the platform. One of them asked the baggage master, who was standing near, if she could take a ride on a car which was on the adjacent track. He said she might, and thereupon the girls got on board the passenger car. The switching engine was attached to the car and it was started for the purpose of moving it to another track. All went well and the girls were enjoying their ride when one of them called out that the train was going away from the city. The girls, in a panic and afraid that they were being taken away, rushed to the door and jumped or were pushed from the steps. One of them was run over and her father sued the railroad for damages. The Supreme Court holds the railroad not liable on three grounds. First: Because it was not at the time—being only engaged in switching cars preparatory to making up a train to afterwards start—a carrier, nor were the girls passengers. Second: The baggage master had no authority to permit them to get on the train. Third: As they were trespassers, the railroad owed no duty of protection to them and was not responsible for the result of their fright, to cause which it had done nothing.<sup>17</sup>

In the same state the Supreme Court rules that a stipulation in a ticket, sold as good for 30 days, that the purchaser shall have himself identified as such at the terminal point of his journey, and that the ticket shall be good 15 days only after date of identification, is not illegal or unreasonable, but is binding on the party who thus contracts with the company. A passenger ejected for failing to comply with this agreement cannot recover damages.<sup>18</sup>

In Alabama the Supreme Court holds that a person on a car without paying fare, or in a dangerous place, by permission of the conductor is not a trespasser or negligent, unless it is known to him at the time that in giving him such permission the conductor is exceeding his authority.<sup>19</sup>

In Louisiana a passenger was slightly injured by the derailment of the train. He was shaken and bruised, but no bones were broken; he did not call in a physician, and was only kept from his work a couple of days. The jury gave him \$750 damages, which the Supreme Court reduces to \$300, saying: "While courts allow even liberal compensatory damages against railroad companies in cases of gross negligence on their part resulting in some injuries to passengers whom they have undertaken safely to carry for due consideration paid, these corporations are surely entitled to protection against exaggerated claims when the injury received is slight or nominal."<sup>20</sup>

In New York a passenger was riding on a free pass, which exempted the company from any liability for injury, but he had paid for, and was occupying, a seat in the parlor car. He sued the company for an injury received while there. The Court of Appeals rules that the fact that he had paid for the seat in the parlor car did not alter his status as a free passenger, and he cannot recover.<sup>21</sup>

The Supreme Court of Nebraska decides that a company of men, under the control of a foreman, engaged in the business of repairing bridges, water tanks and telegraph lines along a line of railway, in going to or from their labor on a hand car on such railway, are under the control of such foreman, and his principal is liable for his negligence occurring in the course of his employment whereby any of them are injured.<sup>22</sup>

In Minnesota the Supreme Court holds that the presumption that one who is permitted by an employé of a railway company to ride upon a construction train is not lawfully thereon may be overcome by special circumstances implying the authority of such employé to grant such privilege. A person riding on such train, and over and upon side tracks, constructed in the ordinary manner, is deemed to consent to and accept risks incident to such a train and a track of that character; but if, through the neglect of the company to keep such track in suitable repair for the ordinary purposes for which it is constructed and used, an injury occurs to one lawfully upon the train and without fault on his part he may recover.<sup>23</sup>

In Virginia, the plaintiff, a railroad employé, was riding on a railroad velocipede along a track toward its intersection with a street, when he saw a mule and cart in the street ahead of him near the track; he reduced his speed to two miles an hour, and when he arrived at the middle of the street, the mule, being unattended by defendant's servant having it in charge, ran over plaintiff, causing the injuries complained of. The Supreme Court of Appeals affirms a judgment in favor of plaintiff.<sup>24</sup>

The statute of Pennsylvania, of April, 1868, provides that in case an injury is sustained by any person "while lawfully engaged or employed on or about the roads, works, depots and premises of a railroad company, or in or about any train or car therein or thereon, of which company such person is not an employé," the right of action and recovery in all such cases against the company shall be such only as would exist if such person were an employé, provided that this section shall not apply to passengers.<sup>25</sup> In this case a teamster was engaged in hauling iron to a car in the yards of a railroad company, for shipment, and was obliged to cross a street upon which the tracks were laid and which was practically a part of the yard of the company, and was injured by a moving passenger car which hit and overturned his wagon. The Supreme Court holds that he falls within the statute.<sup>26</sup>

In Michigan in an action for injuries caused by collision with a train while plaintiff was crossing a railroad, where the track was in plain view for so great a distance that no one could fail to see the approach of the cars who paid the slightest attention to what he was about, the trial court ordered the jury to find a verdict for the defendant, because of the plaintiff's contributory negligence. The Supreme Court holds that this was correct.<sup>27</sup>

<sup>1</sup> Woodruff v. Rochester & Pitts. R. R. Co., 10 Cent. Rep., 442.

<sup>2</sup> Annapolis & Balt. Short Line R. Co. v. Ross, 16 Cent. Rep., 546.

<sup>3</sup> Francis v. N. Y. & B. E. R. Co., 10 Cent. Rep., 480.

<sup>4</sup> Stat. v. Fremont & M. V. R. Co., 36 N. W. Rep., 505.

<sup>5</sup> Bradley v. N. P. R. Co., 36 N. W. Rep., 345.

<sup>6</sup> Trester v. Mo. Pac. R. Co., 36 N. W. Rep., 502.

<sup>7</sup> Burch v. Augusta S. & S. R. Co., 4 S. W. Rep., 850.

<sup>8</sup> McLean v. Charlotte, C. & A. R. Co., 4 S. W. Rep., 769.

<sup>9</sup> State v. South Carolina R. Co., 4 S. W. Rep., 766.

<sup>10</sup> Cehl. R. Co. v. Terson, 3 South. Rep., 375.

<sup>11</sup> Ill. Cent. R. Co. v. Hawkins, 3 South. Rep., 410.

<sup>12</sup> Mobile & G. R. Co. v. Caldwell, 3 South. Rep., 445.

<sup>13</sup> Newton v. N. Y. & N. F. R. Co., 5 New Eng. Rep., 614.

<sup>14</sup> Phila., Wilm. & Balt. R. Co. v. Davis, 10 Cent. Rep., 551.

<sup>15</sup> Emmons v. Minn. & St. L. R. Co., 36 N. W. Rep., 340.

<sup>16</sup> Lark v. C. & N. W. R. Co., 36 N. W. Rep., 336.

<sup>17</sup> Reaux v. Louisville, N. O. & T. R. Co., 3 South. Rep., 590.

<sup>18</sup> N. R. Co. v. Louisville & N. R. Co., 3 South. Rep., 384.

<sup>19</sup> Alabama G. & R. Co. v. Yarrrough, 2 South. Rep., 447.

<sup>20</sup> Maher v. L. N. O. & T. R. Co., 2 South. Rep., 462.

<sup>21</sup> Ulrich v. N. Y. Cent. & H. R. Co., 10 Cent. Rep., 419.

<sup>22</sup> Sioux City & P. R. Co. v. Smith, 36 N. W. Rep., 285.

<sup>23</sup> Rosenbaum v. St. Paul & D. R. Co., 36 N. W. Rep., 447.

<sup>24</sup> Bowen v. Flanagan, 4 S. W. Rep., 724.

<sup>25</sup> Balt. & O. H. Co. v. Calvin, 10 Cent. Rep., 583.

<sup>26</sup> Straugh v. Det. & N. R. Co., 36 N. W. Rep., 161.





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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The second annual report of the Pennsylvania Employes' relief organization, printed in another column, will be found a very clear and intelligible document. The members take an unmistakable and lively interest in the association, and the material co-operation and interest manifested by the road is made apparent by the fact that there is a surplus of \$111,000, which, without the assistance of the company, would have been practically nothing. In other words the rates have been fixed at the point where the institution would just about support itself from month to month, without accumulating anything for future contingencies. This is good evidence that the assessments have not been placed at an unreasonable figure. While the road is thus giving substantial aid to its employes in a shape that is peculiarly valuable to them, it is really taking upon itself no serious burden, the amount per member being only about \$3 per year (\$58,644; 18,744 members). Surely this is not a high premium for a prosperous employer to pay to a faithful employe; and it no doubt cements a bond between the two which is well worth that amount commercially.

The New York Central and the other Vanderbilt lines, the Erie, Pennsylvania, Louisville & Nashville, and other roads have joined in an appeal to the Postmaster-General concerning the practice of the government in imposing fines for delays of mail trains. The plan for making deductions in case a train misses connection is to withhold one-half the sum due the road for that entire trip; thus on the Chicago-Boston route a delay of half an hour on the Lake Shore would cost the road two-thirds more than would the same delay on the New York Central and 2½ times what would be imposed on the Boston & Albany. If a train catches all its important connections and misses a single insignificant one, the fine is full size nevertheless. The roads point out that hot boxes, fluctuations in traffic, and other causes of delay are generally unavoidable, and say with truth that the present system of fines encourages the running of slow trains, for if a company strives to run trains as fast as it can, the percentage of delays must be larger, because of the smaller possibilities of making up time. Complaint is made that extenuating circumstances—a snow-storm or flood, for instance—which warrant the omission of a fine for delays, have to be presented by the roads; that the Department ignores them, even when reported by the Postmasters, unless formally reported by the roads.

The present practice of the department is a revival of the rule under the law of 1879, afterwards repealed, which required the imposition of fines without discretion; and the larger lines have suffered deductions from their annual income for mail-carrying aggregating many thousands of dollars each. While the justice of this "scaling" of the compensation of the

roads, depending, as it does, more or less on the reasonableness or unreasonableness of the original rates for transportation, cannot be discussed now, it is plain that the methods of the department have been marked in this as in some other matters by a sort of bureaucratic narrowness which obstructs rather than advances business.

The letter from "Superintendent" in another column touches upon an important principle; though just at present many officers seem to need an infusion of backbone rather than of suavity. Many of the evils and difficulties attending the relations of railroads with the legislatures, with their patrons, with neighboring roads, and with their employes have been intensified, if not caused, by lack of publicity and easy means of intercourse coupled with a lack of the disposition to honestly foster cordial and intimate relations. And where this lack has been fairly and intelligently remedied, the results have been encouraging. The Railroad Gazette has pointed this out many times; and, as appears from the letter of this correspondent and of others, practical men believe in the principle. It should be much more widely applied. The right of men to ask for higher wages, to combine for this or other lawful purposes, and to get some one to do their talking for them, is entirely reasonable and should not be discouraged. There is no danger that cultivating a proper familiarity individually will infringe this right; it will rather tend to foster it, and help the employe; for association with his superiors, who are probably better educated and better informed than himself, will naturally enable him to see more than one side and to act more intelligently. He will realize more than ever the necessity of having his case presented by a skillful negotiator and will be chary of mere talkers.

In transportation, as in war and in politics, a man of genius appears now and then, and we are amazed at the simplicity of his methods. When he has brushed away the troubles which baffled his predecessors, we are apt to wonder that the world should have waited so long for him. Perhaps such a genius has appeared in Mexico. At any rate, a Mexican superintendent has boldly and simply solved one of the toughest questions in transportation. To fully understand his achievements, however, the reader must realize well the difficulty which he has attacked. It has long been understood that one most important element in the development of freight traffic is flexibility of rates and classification; and the greatest obstacle to the development of passenger traffic is the difficulty of making varied rates. Thus, when it is found that some material cannot be carried over a certain line at all, except at a very low rate, the rate is reduced to a point which sets that material moving, increases the volume of freight tonnage of the line, adds little to operating expenses, and something to net earnings. In this way, cheap and coarse freight, which cannot be moved at all except at a low rate, is made to contribute to the revenue of the railroad and to the profit of the public. This principle of charging freight what it can afford to pay is a fundamental one, and one of the most valuable in the whole freight carrying business. But in dealing with human beings the case is very different. Here as with freight the problem is to retain present traffic at existing rates, and to devise some means to set in motion the traffic which will not move at present rates. How to keep those people now paying first-class fares still paying them, and yet to get others to travel who cannot afford to pay so much, and further, how to do this without increasing train expenses, is the constant study of enterprising passenger agents. Commutation tickets, family and mileage tickets, excursion rates and school tickets are all useful devices; but still, on the most frequented roads, half-loaded passenger trains are constantly running one way or the other. At some rate these vacant seats might be filled, and any fare got from them would be clear gain to the railroad. And now we come to the Mexican superintendent. Don Jorge Douglas is the Superintendent of the Sinaloa & Durango Railroad. From Culiacan to Altata, the Coney Island of Sinaloa, the first-class fare is \$2.90. Don Jorge realized that at a very much lower rate a great additional travel could be secured, and, therefore, made a second-class rate of 25 cents for the same trip. But the Sinaloa & Durango has only one passenger car, and naturally every one paid 25 cents and traveled second-class. The genius of Don Jorge was equal to this emergency, however, and he issued an order that second-class tickets should be sold only to those who wore guaraches\* or went barefoot, while all others should pay full rates. Now, when a second-

\* Sandals.

class ticket is asked for at the office or offered on the train, the feet of the passenger must be shown.

The Inter-state Commerce Commissioners have sent out a proposed form of annual report to be made by the railroad companies, of which we give a synopsis in another column. The Commissioners invite discussion and criticism before issuing it in its ultimate form. One chief criticism, and one which will occur to most railroad men, is that it is too long. The blank occupies 58 pages, and some of them crowded pages at that.

The information asked concerning the financial management contains nothing specially open to objection. We note with satisfaction the questions as to the terms on which the stock was issued; also as to the form of the floating debt. We doubt whether the cross division of debt according to objects and forms is strictly practicable. Two simple divisions would apparently have answered the same purpose, and would certainly have been much easier to give. This criticism applies to several other schedules. What sense is there, for instance, in asking for the cost of barges and floats per mile of road? or the maximum weight of American iron rails per yard in each of the several states through which a railroad passes? We do not wish to discourage the Commission in asking for information, merely because it will be a trouble to the railroads. The itemized accounts of construction may give trouble; but it is right to ask for them, for the information is very important. What we do object to is giving the railroads trouble about matters which are of little or no use.

The analysis of operating expenses groups as the first item of transportation expenses the amounts paid for labor, and attempts some slight classification of laborers, "locomotives, other trainmen, station agents, clerks and helpers, switchmen, flagmen, watchmen." We do not like this classification. For instance, where is a station watchman to be included—under No. 3 or No. 6? There is some difficulty about any classification of laborers, which the Saratoga (State Railroad Commissioners') system can hardly be said to have solved by calling all laborers "station helpers" when not otherwise designated. But if any division is to be made, that into shopmen (whose wages come under the head of equipment), trackmen, trainmen and stationmen, seems the simplest and most natural. That is in principle the system adopted by the New York Commissioners. The Inter-state Commission has used the New York form as a basis; but we think they make a mistake in carrying it too far into detail.

We also doubt the wisdom of allotting all the items in arbitrary proportions to freight and passenger traffic respectively. How can any one tell what proportion of repairs of road crossings, or wages of track-watchmen, is chargeable to any particular part of the traffic? These expenses would have to run on all the same if part of the traffic were lost. It is positively misleading to treat general expenses as if they were chargeable to specific pieces of operation. It will make a great deal of trouble, will do no good, and may result in some positive harm.

While we believe that the Commissioners' form is good in its general basis, we trust that it will be much simplified and shortened before reaching its final shape.

#### Curve Resistance and Rail Wear.

On another page will be found a communication, from Mr. W. Howard White, on curve resistances and rail wear, and we must confess to surprise at some of the ideas which he advances. Mr. White says, either explicitly or by inference, that: (1) There is a practical tendency on the best roads to increase the side angle of the head of the rail. (2) The wheels of a train are all drawn toward the inner rail on a curve, and the flange wear, if any, is on the inner rail, except in running down grade with engine brakes set. In this case the wheels are crowded to the outer rail and flange wear begins. (3) No motive power is lost by the wear of flanges against the rail. Therefore it is better to increase the flare of the side and thus avoid cutting away the fillet.

We doubt the general truth of the first proposition. To be sure it is not very definite. There is a tendency on some roads to still further increase the side angle of the head, but that the tendency now shows itself on more than one or two of what, by giving the term its greatest comprehensiveness may be called the best roads, we doubt. The prevailing sections, no doubt, show a side angle that was uncommon, or did not exist, 10 or 15 years ago, but that that angle is now increasing, as we have said,



we doubt. Indeed, in looking over the sections now rolled in heavy rails, for the great roads, we seldom find the side angle greater than 5 degrees. The Lehigh Valley sections, to be sure, have angles as great as 10 degrees, and the Lehigh Valley is technically one of the "best" roads beyond any doubt, but its practice does not make a "tendency" by a good deal. The Lehigh Valley section and joint work beautifully together, and make an excellent track, but the section is open to other criticisms than those made against the side angle of the head.

But the designers who are responsible for the increase of the angle of the side of the head did not ascribe to that form other virtues than that it gave a good angle and bearing for fishing, and provided a comfortable place for the repose of the fish plate in its old age. The notion that it is well to provide something for the flanges to rub against in order to save the fillet, was evidently an afterthought, and is quite modern. Generally, we venture to say, those who slope the side still have in mind the real reason for that form of section, and look on it not as a merit, but as necessity with the prevailing form of joint. It cannot be denied that the slope makes it easier for a wheel to mount the rail, and thus encourages derailments, and that it very greatly increases the rapidity of wear both of rail and wheel. A certain work is added in rubbing friction, and this work is done at a greater distance from the tread. Mr. White does not deny that force is absorbed in this work of wearing out the flanges and rails by rubbing them together, but his argument is that the force so absorbed is useless or detrimental, and otherwise would be taken up by the brakes.

These assumptions as to work done bring up the question of which rail of a curve the wheels bear against. In the case of a double track road, a curve on which the traffic is down grade bears its own marks, and there can be no question. If the traffic is up grade, the relation of speed and super-elevation may be such as to throw most of the wear on the inner rail. This has been observed particularly on some of the "coal" roads, where safety of fast passenger trains has led to considerable elevation of the outer rail, while much of the traffic over the curve was heavy, slow trains. Here the inner rail shows flange wear. But these are exceptional cases. A walk over the curves, both level and on grades, on a single track road, running the usual freight and passenger trains, will yield most unmistakable evidence that such flange wear as there is against the outer rail. When the wear has become perceptible, it will usually be found that the metal of the top of the inner rail has been crowded over both sides, and that there is a burr on the inside; and there it sticks, a visible and tangible refutation of the notion that the car wheels are drawn against the inner rail by the pull of the engine. Further, the inner corner of the outer rail will be found highly polished and absolutely free from this burr, and the side of the rail will be polished to a greater or less depth according to its form. Of course there are exceptions to this condition of things. Tight gauge, bad joints, or excessive elevation may throw the wheels against the inner rail in places; but the rule will, beyond a doubt, be found as we have given it. Repeated observation proves it, and some diagrams which well show it will be found on page 293 of Mr. Wellington's "Economic Theory of Location." In the same chapter are cited some experiments made by the author, with models, which showed that only the outer wheel of the forward axle of an ordinary truck bears against the rail, while the others normally stand away from the rails. These are the proofs from experiment; it is not necessary to go over the theoretical demonstration of a fact apparently so well established. We cannot get away from the conclusions that there is flange friction against the outer rail when the locomotive is pulling, and that there is some resistance from this cause, and that this resistance is increased as the surfaces in contact are removed further from the centre of rolling contact, and that they are so removed by increasing the slope of the head. The amount of the resistance from this cause must vary with the speed, the super-elevation and with the surface in rubbing contact and the relative position of that surface, and obviously this latter element depends upon the forms of rail and flange, either new or worn. If we are correct, therefore, the form of rail advocated by Mr. White is not a good one so far as motive power is concerned.

We do agree with him, however, as to the desirability of a wide head, and would give the curve of the crown a long radius, both to secure a large wearing surface for the rail and to distribute the wear on

the tread of the wheel. With a broad head and vertical sides, good angle and surface can still be had for the joint.

#### Railroad Accounts.

In an article on railroad expenses, March 16, we called attention to the misleading character of maintenance charges. They vary not so much on account of changes in the actual outlay as on account of changes in the time when the railroad authorities choose to pay for such outlay.

But some one will ask, "How can we know what the condition of a railroad is, except by getting some such estimate of maintenance charges? We cannot know the net earnings of a railroad unless we deduct maintenance as well as transportation and general expenses. For this purpose a rather arbitrary estimate is better than none at all." We can only reply in the words of Josh Billings, that it is sometimes better not to know so many things than to know so many things that ain't so. Our knowledge of net earnings is apt to be a knowledge of things that are not so.

We are told that Socrates claimed to be the wisest man in Athens. "To be sure," he said, "I know nothing; but then I am the only man in Athens who knows even that." Socrates would have been a good man to give expert evidence in net earnings.

It will perhaps sound startling to say that no one in the world knows how much ought to be allowed for maintenance in estimating net earnings; yet such is the fact. If it is said that a railroad pursues a correct policy in this matter, all that we really know is that it pursues the same general policy as other honestly managed roads. Whether that policy corresponds with the true facts of the case, no one can judge. The whole method of expounding net earnings is based upon the assumption that railroads will continue to be operated for an indefinite period in the same general manner that they are operated to-day.

Let us illustrate the meaning by a specific instance. One man invests a million dollars in a railroad, another in a factory. Each finds the excess of his earnings above wages, materials and repairs to be \$100,000. The railroad counts the whole as net earnings, available for dividends. The factory, if under conservative management, does not. It makes a certain allowance for deterioration, and either extends its plant out of the proceeds of current earnings, or contracts its net liabilities by accumulating a reserve.

We admit that there is a difference between the conditions of a railroad and factory, corresponding to this difference in practice. A railroad, if kept in proper repair will not deteriorate nearly as fast as a factory. It may be that the value of its location will increase faster than the value of its plant will decrease. It may be that there is little chance for new inventions which will suddenly diminish the value of railroad investments. But no one knows. Fifty years ago the earning power of the Erie Canal seemed the surest thing in the world, and least likely to be superseded. Yet the progress of railroad invention gradually made it impossible to charge tolls at all. We have no guarantee that this history will not repeat itself. If so, it will be found that net earnings have been calculated on a fictitious basis; that railroads have been dividing sums which should have been employed in keeping their capital account down.

This is no idle fancy, it is recognized in the practice of the railroads of continental Europe. The financial managers of these roads, partly on account of the conditions of their charters, partly from such considerations as we have just given, provide for the gradual "amortization" of their capital by a system of sinking funds, not unlike the allowance for deterioration in a well managed factory, except that it covers a longer term of years. It may be that our policy is right and their's wrong, but there is no absolute means of deciding.

Absolute net earnings are something which we cannot exactly determine. All that we can hope to determine from a series of railroad reports is, first, whether the general policy of the road is more or less conservative with that of other roads like it; and second, whether its earning power is increasing or diminishing from one year to another. Each of these results can be pretty clearly indicated, but under the present system of railroad reports we sacrifice both of these things for the sake of a compact estimate of net earnings which seems to indicate a great deal and really indicates nothing.

The variations in the earning power of the road are measured by its gross earnings, less expenses for transportation, motive power and, to a certain extent, car repairs. Gross earnings alone are, of course, no standard, because operating expenses may vary so greatly. But such variations in amount of operating

expense are nearly all included in the items just enumerated; it is only a source of confusion to deduct those charges whose amount is fixed merely because the directors have chosen one time rather than another for paying for them.

On the other hand, the question whether the general policy of a railroad is conservative, depends almost entirely upon the way in which its capital account is treated. Railroad reports of the better class to-day give a great deal of incidental information on this head. The improvement in this respect in the last ten years has been very great. A man who will look into such a report with care now finds little reason to complain of the way in which he is treated. But there are many cases where a man has not the time to give such careful reading to details; cases in which he desires a conspectus which shall give a general view of the treatment of capital account. In such cases he is almost sure to be disappointed. At their very best there is usually a failure to give a clear idea of the amount of improvements on the old line which might have been charged to maintenance but were charged to new construction, or *vice versa*. No attempt is made to connect the reports which have thus been somewhat arbitrarily separated.

Our criticism of the present system and our line of suggestions may be summed up in a few words. A railroad balance sheet is, and must be, an account of financial operations. It however pretends to be, to a great extent, a description of traffic operations, and is arranged as such. Let us abandon this pretence. Let us classify expenses in the balance sheet according as their payment can or cannot be postponed; and let us arrange the exhibit of the first class in such a way that the postponement of any payment will make as little apparent difference as possible in the general showing. In this way we shall reduce to a minimum the evils of the arbitrary separation of maintenance and construction, which by the present system of disconnected balance sheets are increased to a maximum.

Our plan would be somewhat as follows:

Account of the Financial Operations for the Year 1887.	
Gross earnings.....	\$5,000,000
Current Expenses:	
Transportation.....	\$1,200,000
General.....	400,000
Equipment.....	400,000
	2,000,000
Balance current earnings.....	\$3,000,000
Other income.....	500,000
	\$3,500,000
Taxes.....	\$400,000
Interest.....	1,000,000
	1,400,000
	\$2,100,000
This sum of \$2,100,000 represents the excess of income over those charges which cannot be deferred:	
Income balance.....	\$2,100,000
Charged to track maintenance.....	\$800,000
Dividends.....	1,200,000
	2,000,000
Surplus.....	\$100,000
Increase of capital account.....	1,000,000
	\$1,100,000
Improvement of old line.....	\$300,000
Outside investments.....	200,000
New construction.....	550,000
	1,050,000
Balance increase of cash assets.....	\$50,000

We do not expect these suggestions to command approval at first sight. The arrangement suggested differs too much from all our traditional habits, and seems to withhold a great deal of information which we have been accustomed to demand.

But on examination we think that it will be found: 1. That the information thus withheld is precisely what has been habitually used to mislead the public—in other words, that the loss is apparent rather than real. 2. That the transposition of the allowance for track maintenance to a point where it can be compared with allowance for new construction on old track reduces to a minimum the evil due to the arbitrary separation of these two items. 3. That the analysis of the increase in the capital account still further diminishes this danger and makes the necessary connection between the general balance sheet, the income account, and the facts contained in the body of a report.

We do not offer these ideas as suggestions to the Inter-state Commerce Commissioners. It would be unwise for them to undertake any radical reform in the methods of accounting just at present. Nor should we urge their sudden adoption anywhere until they were thoroughly discussed. But we believe that the fundamental idea advanced is correct and important; and we strongly hope that others will be led to think about it, and to make it the basis for criticism and suggestion. We believe that things are likely to move in this direction, and that it is much to be desired that they should; and we offer this article as a means toward that end.



## Some Lessons of the Storm.

The killing of three men on the Lehigh Valley and of five on the New York Central in the attempt to open a track through big drifts were among the saddest features of the late storm. We have not full particulars concerning the make up of the trains, their speed, and the abilities of the men in charge in these cases, and cannot say what blame, if any, should attach to any one; but there is no question that this is a work in which great caution is required, and that enginemen and conductors who are otherwise careful and prudent may easily get careless and overlook proper safeguards. It is perhaps too much to say that engines can be always kept on the track in deep snow or that plows can be prevented from going into the ditch, but in view of the complicated conditions generally present it is at least reasonable that none but the most experienced and cautious men available be placed in charge. It is easy, with the powerful engines now built, to apply too much force; the use of three, four or more engines is no doubt often justifiable and even necessary, but the main object of this is, or should be, to provide power when the rail is very slippery by distributing the driving wheels over a long distance in the hope that they will not all be on slippery places at the same time. But to use such an enormous aggregate of power for the purpose of storing up momentum by taking a long "run" into a drift can easily be carried to a dangerous extreme, and to plunge into a drift with force enough to crush the plow to splinters is a danger that is so common that it needs to be carefully guarded against. The coupling of engines together by the ordinary "stiff coupling" instead of the more modern stout pushing timbers, firmly fixed to the frame, is a distinct invitation to disaster. If it is necessary to use engines which are not provided with the dead blocks in front, their pilots should be taken off so that the buffer beam can press directly on the buffer of the tender in front. The best of judgment is required in estimating the density of a snow-bank and the consequent rate of speed proper to be used. The fatal drift on the New York Central had been settled by the mild weather of two or three days, so that the snow was doubtless much more moist and heavy than it was on Monday. All these considerations go to show the importance of putting the most careful men and those best posted concerning the local characteristics of the road in charge of snow trains. A conscientious superintendent of high reputation lately said that he never sent a plow into a drift without sending himself with it. This is the right spirit, surely, and tends strongly to make one prudent; but in addition to this, careful consideration and study are necessary, and division superintendents should be trained not only to bravery, but to wisdom as well; and the practice of consultation between the different men on a snow train who have had the most experience should be inculcated, so that in cases where the best fitted or most desirable person is not available to place in charge, the responsibility will be well defined and the men will have some sort of precedent to guide them. If the superintendent, when he commands in person, shows his cautiousness by consulting with the conductor and engineer, they will be led to similar wise practice when sent out without him.

These reflections may be deemed somewhat behind time at this date, but it is to be remembered that the lessons of present disasters will do us little good next winter unless they are fixed in our memories now; and with a view to showing the importance of the subject and of making it remembered, we print in another column of this issue the rules of the Northern Pacific for the guidance of men in clearing off snow.

A rotary snow shovel or two would seem to be a good investment for a half dozen or more of the big eastern roads. It is true that these machines cost a considerable sum, and that in most winters the roads south of the Boston & Albany and New York Central can be kept reasonably clear with old fashioned appliances; but the testimony of those who have used the new device in the Northwest would doubtless be strongly in favor of its adoption as a matter of economy on such a road as the New York, New Haven & Hartford. It seems quite certain that one would well-nigh paid for itself on the New York Central of this road (not to mention the more northerly branches) in this one storm, the closing of such an important passenger route for four or five days being quite a serious affair. The Boston & Albany, which is well equipped, both as to men and plows, had to put forth its best efforts for 36 hours or more to rescue a train load of passengers only eight

miles from a divisional terminus, and an effective machine would have allayed considerable anxiety, to say the least, as well as a good many days' wages and rations of shovelers.

In another column we print a letter from an old railroad man, giving some useful hints concerning the points that officers should provide for in snowstorms. We do not know what truth there is in the statements concerning the depth of snow and the speed of the train on the Harlem, but the speed was too great, at all events. It is doubtless a fact that much delay was occasioned by derailments in the late storm, but how many of these could have been prevented it is hard to say. The writer saw, however, the derailment of one heavy passenger engine in a drift, which was foolish enough. It required no more foresight to predict a run-off in that sort of a drift than it does to predict that an engine will not be derailed on a good, clear track. No doubt many trainmen become shiftless after they have been out 24 or 36 hours.

Even with the best appliances, and telegraph or no telegraph, there should be provision made for engaging extra men when an emergency occurs. If a road cannot trust its station agents or section masters to hire men, it would perhaps do well to engage better men in their places. It may happen any winter that a dozen extra men should be hired at a small station early in the morning before they go elsewhere to work. To wait for instruction by wire may lose them. Our correspondent took the bull by the horns and went ahead without orders. A conductor on a New England road a few years ago, when caught between two big washouts with the wires down, built a large trestle from trees cut near by, superintending the job himself; and he had nearly liberated himself before the superintendent got around to him. The late T. J. Potter is said to have made his first mark in the world by a bold stroke without waiting for orders. Why not give the ordinary men a few lessons or hints in this line instead of leaving it all to the geniuses?

## The Strike.

The Chicago, Burlington & Quincy strike seems to have about reached its end. It is said that the road now has as many engineers as before the strike, and has ordered its agents at distant points to engage no more. Chicago dispatches of Saturday indicated that Mr. Arthur had had a conference with President Perkins, but the statements are very brief and seem to be of doubtful authenticity. Mr. Perkins was said to be willing to pay what other roads pay; but that is only what was said at first, and may mean much or little, according to the spirit in which the question is discussed. Mr. Arthur was said to be ready to sacrifice the freight runners if he could put the passenger men back in their places pending negotiations. This is substantially a confession of defeat; but the road, if it keeps its word with the newly engaged runners, as it undoubtedly will, cannot accept even these terms of capitulation without considerable embarrassment.

Perhaps other companies than the Rock Island and the Chicago, Milwaukee & St. Paul have lately dodged handling C., B. & Q. freight, but only those two companies are credited (or discredited) with actual official refusal to interchange with the boycotted road. The boycott has been dignified by the name of "neutrality," but such a perversion of terms can deceive no one. Had the enginemen of the so-called "neutral" roads ceased to pay dues to the Brotherhood while the strike was on, or in any way to aid it, there would have been more appearance of neutrality, but even then it would have been but an appearance. The suspension of relations with the boycotted road remains still a violation of law and of ethics, and is an active participation in the fight, and it is to be hoped there will result a crop of decisions which will clear up the vision of railroad managers and of employees on this point, and establish their legal relation to each other and to the public.

Within the week there have been other incidents of the strike which deserve attention. Strikes have been reported on the St. Paul, Minneapolis & Manitoba and the Central Iowa, and have been immediately afterwards reported as settled. Engineers are said to have refused to haul Burlington cars in a number of places, Cairo, Ill., Decatur, Ala., and Boston, Mass., among others. The brotherhood, or individuals in it, seem to be waging a mild sort of guerilla war, and superintendents seem to be equally undecided, most of the dispatches stating that enginemen's wishes are deferred to. The Atchison, Topeka & Santa Fe runners were suddenly called out for no reason which has been made public. The men simply said that they

were tired. This gave their strike an appearance of mere wantonness, and, of course, deprived the men of any public sympathy which they might have claimed had they assigned a plausible reason for their action. The men seem to have realized their foolishness, and they went back to work within two or three days, though not until they had blocked traffic so effectually that the road issued notices refusing freight. The published correspondence between their chairman and Mr. Arthur leaves one in doubt as to the extent of the latter's influence and authority. This strike was, moreover, so far as can be seen, in direct violation of their agreement made a few weeks ago with the company, and that again put them in a very bad position. It made them appear as a reckless and unreliable body of men, and that we are not prepared to believe the Brotherhood to be. The probable explanation is that whoever ordered the strike had before his eyes the possible legal consequences of a "sympathetic" strike, and that the men were instructed to quit work as individuals, of their own volition, which they have a clear right to do, and not in furtherance of a concerted scheme to support the C., B. & Q. strike, which they clearly have no right to do.

The part taken by some high officers of the Federal and state governments has also been discreditable. It is not surprising to know that Governor Larabee should have tried, in an impertinent and sophistical letter, to put upon the road the blame for the public inconvenience, and no one will be misled by his transparent phrases; but it is surprising, and humiliating too, to see the officers of the Post-Office Department dicker with the strikers for permission to move the mails. Of course the demand for Congressional investigation has been brought up. The eagerness of the politicians to profit by the disturbance ought in itself to make men so intelligent as the locomotive engineers suspect that there is something wrong in their position.

Various complaints have reached us that we have not treated the men fairly in this strike, and assertions are made that the men on the Chicago, Burlington & Quincy have been subjected to abuses which had become unbearable. These assertions, however, have been entirely vague, and we know of no reasons for the strike other than those that have been published, and those we have considered insufficient. If the strike ends now, it doubtless will not break up the Brotherhood, as has been suggested. That would be a consequence which all who are most familiar with the history of the organization would deplore. But it will, in any case, inflict on the order a serious loss in money and in the public esteem. We had not supposed that it needed such another lesson; but if this experience strengthens the temperate and conservative element in the order, and discourages the hot heads, who are said to have lately grown unruly, it will not be wholly useless.

## The Blackshear Disaster.

Eighteen-eighty-seven had a great railroad slaughter in each of the first three months, and now 1888 has done nearly as badly, the Haverhill calamity in January being followed by this Georgia misfortune in March.

The particulars of these terrible wrecks are becoming distressingly familiar, and we do not need to recount them at any length to our readers. The lessons, too, would seem to have become trite after a whole year of startling cases, and to demand no further repetition; but the stern fact remains that the dangers which these disasters exhibit still exist on hundreds of railroad lines, and nothing can be surer than that punishment will be inflicted so long as our practice is far below the well known standards of requirement.

We do not know the real condition of this Hurricane River trestle. There may have been a guard timber and the sleepers may have been securely blocked to prevent bunching, but the description of the action of the tender truck indicates that the trestle was faulty in both these respects. The train may have been running at a reasonable speed, but the indications are that it was running at a 40-mile rate on a bridge which was suited for half that speed. A trainman says the train was traveling 45 miles an hour. The regular speed of this train between Savannah and Waycross, 96 miles, is 36 miles an hour, including stops. This doubtless necessitates 45 miles an hour or faster over much of the way. The check chains to the tender truck may have been reasonably strong, though the fact that the truck turned cross-ways is *prima facie* evidence that they were not. So far as can be judged, therefore, from present information the lessons are plain, whatever may be the degree of blame attaching



to this particular road, which has the reputation of giving much attention of an exceptionally intelligent sort to its track and roadway. If the bridge floor was of the very best, the speed reasonable and the track and wheels first-class, the public will doubtless render a verdict of acquittal. But if there was a plain lack in these respects the officers of the road well know where the blame lies whatever the press or public may say.

The question of speed modifies all questions of this kind and really should be a first consideration, though it is often made the last in importance. There are miles of weak trestles which the owners cannot afford to rebuild; there are numerous roads which cannot at once renew even the floors of these bridges; but they can run slowly over these shaky structures. The question is, whether people will continue to entrust their lives to such roads when they bid for patronage by running fast trains in spite of the great risks that must be taken.

The great value of check chains of proper strength, and the fact that a large portion of those in use are not strong enough to be of much account, ought to be well known to every railroad officer. The fact that only the most ceaseless vigilance will insure the actual and constant use of this and other safety devices even after they have been ordered should be equally well known. The fact that the tender wheels bumped over the sleepers for about a quarter of a mile is a renewed illustration of the lesson of the Mittenague accident in January of last year, that the tender is a specially dangerous vehicle by reason of its being heavily loaded (with an unbalanced load—water), on a short wheel base, and without any person upon it. The derailment of any other vehicle in the train would have been at once noticed and the brakes applied. The use of some sort of derailment brake would therefore seem to be especially valuable on passenger engines' tenders, whatever may be said about their expensiveness when applied to all cars or their liability to cause unnecessary stops.

#### Journal Lubrication.

The letter in our last issue giving a log of a run on a limited train gives in a brief form the experience of many as to the frequency of hot boxes on fast express trains, particularly on some routes.

The waste of power, loss of time and risk incurred by hot boxes cannot be easily put into exact figures; but it is evident that it is worth while to incur considerable expense if hot boxes can thereby be avoided. Much importance is usually laid upon the bearing metal being of good quality, and this is no doubt a very important factor. It cannot, however, be maintained that the use of expensive bearing metal will unaided secure satisfactory results.

The great variety of materials used with success in different bearing alloys shows that many diverse metals and alloys will wear well and run cool, and that hot boxes cannot be avoided by merely using one particular bearing metal. A hard compound of copper and tin with a minimum quantity of zinc is often considered the best bearing metal, but in marine practice a metal almost composed of zinc is very largely used. The recipes for so-called Babbitt metal differ very widely, lead and zinc being largely used in some cases and tin and antimony in other mixtures, while the difference in the behavior of these alloys is not always in direct proportion to their cost.

A journal box or other bearing will only run cool when all of several conditions are observed:

1. The wearing surfaces must be sufficient.
2. The wearing surfaces must be smooth, have a uniform bearing, and be provided with oil ways which will evenly distribute the lubricant.
3. Dust must be excluded.
4. The lubrication must be constant and must not be suspended by leakage, hot or cold weather, a slight heating of the bearing, or the effect of rapid motion on the means by which the lubricant is fed to the bearing surfaces.

It can hardly be maintained that the present crude form of journal box fulfills these conditions. The bearing surface is not sufficient for the present heavy cars run at a high speed for long distances without stopping; dust is not excluded; leakage is not prevented; the supply of lubricant is uncertain, and is affected by many extraneous causes, while the method by which the lubricant is conveyed to the journal is not only inefficient for its purpose, but is in itself a very frequent cause of heating. A cold iron axle is particularly apt to catch up threads of waste and wedge them under the brass, one of the most frequent causes of heating.

The Master Car-Builders' Association at their last

convention appointed a committee to consider this subject, and the circular of inquiry issued will be found on another page. It is to be hoped that their inquiry into this question will result in some improvement in present practice, which is wasteful of oil and fertile in hot boxes.

#### Steel-Tired Wheels for Passenger Service.

The recent discussion at the New England Railroad Club on the subject of steel-tired wheels may be regarded as showing that the Haverhill accident has drawn attention to the necessity and possibility of using safe wheels under passenger trains. The admirable paper read by Professor Allen showed very clearly that practically absolute safety can be secured, and further, that a broken tire is rendered harmless when fastened to the body of the wheel in a manner which fulfills certain conditions. As pointed out by Professor Allen, the principles on which a tire fastening should be designed have been shown to be correct by actual experience and deserve careful attention.

While a solid wheel of good material is undoubtedly lighter and simpler than a tired wheel, it can hardly be said to be so safe. A flaw in a solid wheel can spread and become dangerous, when the whole wheel must be thrown away. Should a flaw occur in the body of a tired wheel, it cannot spread to the tire, while should the latter be cracked, the centre is unaffected, and the tire cannot fly off, because it is held in place by the retaining rings.

The relative safety of good and poor tired wheels is shown by the figures given in Professor Allen's paper as to the relative failures of tires in Great Britain on wagons or freight cars belonging to private owners and those belonging to railroads. The tires under the latter cars are more carefully fastened and are removed when worn down to a given minimum thickness. The private owner's cars (mostly coal cars) are not so carefully made or maintained, and consequently contribute an increasing proportion of the whole number of tire failures, though the number of private owner cars has probably decreased during the last few years. The railroad cars, though largely increased in number, show a decreasing proportion of failures. In the five years, 1878 to 1882, the failures on wagons owned by the railroads averaged about 1 in 6,700, while during 1883 to 1887 the failures approximately were in the proportion of one tire per annum for every 8,000 running. The proportion of broken tires in passenger service has declined in a similar manner. The number of failures each year is tolerably constant, while the number of wheels in service has increased over 33 per cent. As the majority of the breakages occur with iron tires, all of which must have been running for at least eight years, it is evident that steel tires seldom break when made of good material and properly applied.

The tone of the meeting at Boston shows that the question of adopting safe wheels is rapidly coming to the front, and the general tendency to improve upon existing appliances is clearly shown in the following extract from a letter addressed to the present writer by a well-known Superintendent of Motive Power.

"We have, as you possibly know, used comparatively few steel tired wheels, and our observations have been confined largely to the wheels of the Pullman Company, and we cannot say that they have given serious trouble. Personally, I do not believe in anything but a solid wrought-iron centre, or one of equally good material, with the tire shrunk on and fastened with the Gibson or Mansell rings."

#### The Train Telegraph in the Great Storm.

The Consolidated Railway Telegraph Co.'s induction system of telegraphing to and from moving trains, with which the readers of the *Railroad Gazette* are familiar, has shown itself to be of peculiar value on the Lehigh Valley during the recent severe storm, and has, by its very creditable record, drawn out renewed praises from the officers of the road.

This road—that is, the New Jersey Division, between Perth Amboy and Easton, Pa.—was completely blocked, as were all others in this region, and its regular telegraph wires were disabled early on Monday morning, thus cutting off all communication except that afforded by the train telegraph wire. This line, being of new steel wire and on short poles which were amply sufficient to sustain the load, remained intact, except in one or two places where trees or other telegraph poles fell upon it.

On Wednesday afternoon, March 14, a shovelers' train, consisting of three engines and two cars, and a fourth engine pushing, was thrown from the track by a broken rail as it entered a huge drift, on a curve, near Three Bridges, N. J. It was running quite rapidly, and the three leading engines were overturned and four men were killed, as well as a number injured. The cars, packed full of men, were saved from crushing only by the alertness of the engineman of the pusher, who reversed in time to hold his engine from

pressing on them. One of the cars in the train was equipped with the induction telegraph instruments, with an operator in charge, so that the news of the disaster was communicated to headquarters immediately, thus saving valuable time in sending aid to the injured men, and affording the very best facilities for receiving instructions from headquarters concerning the clearing up of the wreck, which, of course, took a long time. The wire of the induction system, it will be remembered, is upon poles about 15 ft. high, being placed at this height in order to bring it as near as possible to the roofs of the cars. It was, therefore, completely buried in the snow at numerous places; but it worked perfectly and was the only reliance of the road for telegraphic communication for three or four days. The company, it will be remembered, has kept its operators on the through passenger trains of the road, with a view to accommodating passengers and thus bringing it favorably before the public; but in this emergency it was decided, and very sensibly so, that the best interests of the passengers as well as of the road demanded that the safety of trains and the facilitating of their passage receive first consideration, and the operators were, therefore, withdrawn from the passenger trains and placed upon the work trains which went out to clear the road of snow.

The advantage which this system would afford to passengers has also been strikingly illustrated in hundreds of cases during this storm. Passengers by the hundreds have been imprisoned in trains for from 24 to 48 hours or more, and often in places where food and fuel were scarce. On account of the very unusual severity of the storm the anxiety of these passengers and of their friends at home has been exceptional, and any means of communication would have been a great boon and would have been willingly paid for at high rates. A passenger who was in a blockaded train near Philadelphia for a long time on Monday, and who was posted as to the merits of the train telegraph, created a lively interest among his fellow passengers by telling about it. Numbers of the passengers asserted that they would gladly have given five dollars for a chance to send a message under the circumstances.

While a great number of telegraph poles were blown down during this storm, it is to be noted that many others withstood it successfully, notably the excellent new line of the Long Distance Telephone Co., between Boston and Philadelphia. We think it will be found that most, if not all, of the poles which were demolished were either very old or heavily loaded, or both. It is well known that thousands of very old and weak poles are standing along the railroad lines of this country, and it is to be regarded as fortunate that the great numbers of them which have been blown down so as to lie across the track have not derailed any trains. With stout poles, loaded with only a reasonable number of wires, there is no reason why telegraphic communication should not be reasonably well kept up, even in spite of so high wind and so much sleet as have characterized this storm. It would seem to be a very simple duty, as well as economy, for railroad managers to take an interest in this matter, and not depend so completely on the telegraph company as is generally the case. And, as a further improvement, although it ought not often to prove of value in this particular line, the poles should be set as far back as possible from the track.

It has been well known that the Inter-state Commerce law was rather systematically evaded at some points by false classifications, chiefly on west-bound freight, and false weight on east-bound. As long as any roads, or, one might almost say, any agents, were ready to connive at these practices it was impossible to stop them. Cars could be weighed *en route* in a few cases, but not habitually. The attempt to do it in all cases would have involved serious delay and some increase in cost of transportation. Still less was it possible to open packages and see whether the contents were correctly described. A road which subjected its shippers to annoyance of this kind, even when there was some just ground for so doing, at once became unpopular. We know of one shipper who says he has given a great many false descriptions of goods, but that the only case where the packages were opened was one where he happened to have told the truth.

The evils of underweighing and underbilling have become so serious that Mr. Fink has addressed a letter to Senator Cullom, urging that Congress should pass additional legislation on the subject. Commissioners Blanchard and Faithorn have also given some interesting testimony on the same point before the Inter-state Commerce Commission at Chicago, as will be seen by reference to our traffic columns. It is suggested that a law should be passed making intentional misrepresentations of the weight and character of shipments on the part of the shipper illegal and punishable. Such a law would simply extend to the shippers the provisions already in force against the railroads. But the effect would be much greater than this, for it would place the responsibility where it could be fixed. It is hard to prove that a freight agent knew of a fraud which was being practiced upon his company. It is still harder to fix any responsibility upon the company itself; for the railroad, even when it hopes to gain by such practices, suffers a loss on the face of the transaction; and it is always hard to prove deceit on the part of the person who suffers an apparent loss. But it would be easy to prove a case against a shipper, because he would presumably know what he was shipping, and would be the party whose gain from the fraud was most direct and obvious. It is to be hoped that a law will be passed. The mere recognition by the law of the responsibility of the shippers in this matter would have an indirect moral effect which cannot be overestimated. It would protect scrupulous roads and shippers against unscrupulous rivals both in transportation and in trade.



The most conspicuous feature in the Illinois Central Report for the present year is the increase in capital account. Eleven million dollars of additional stock have been issued—\$1,000,000 for an improvement fund, the other \$10,000,000 chiefly employed for the purchase of stock of other companies. Four million dollars more of expenditure of the same sort is to be met by an issue of bonds. This increased capital by no means represents increased liabilities; the expiration of the unprofitable lease of the Iowa lines made it possible to purchase their stock and control their operation at a much less price than it had previously cost.

Several causes combined to operate against the apparent success of the company. The readjustment of certain claims with the Iowa lines produces an apparent (though not real) diminution in the surplus of \$654,000. The fact that the receipts of the Iowa lines for 1887 for a part of the year are compared with those of 1886 for the whole year, makes a decided difference in gross earnings. There is thus an apparent decrease of \$23,000 in net earning; but the relief from the necessity of paying rent made a difference of \$203,000, and changed the net results of operation to a balance of \$180,000 in favor of 1887. Of course this is very far from meeting the \$770,000 dividends required by the additional \$11,000,000 of capital. But if the advantage from the termination of the lease had begun earlier in the year, the difference would not have been nearly as great. On the whole the showing seems by no means unfavorable. Anything more definite than this it is impossible to say as long as the capital account is in its present transition state.

The transfer of the Erie Express Co. to Wells, Fargo & Co. has been recently announced. The agreement, so far as it is published is, that Wells, Fargo & Co. shall pay to the New York, Lake Erie & Western Railroad 40 per cent. of gross receipts for express matter and shall take the property of the Express Company at a valuation to be fixed by two appraisers. No mention has been made of any bonus or other payments. The agreement is for 15 years. Wells, Fargo & Co., by this arrangement, secures a transcontinental line, as within the last year it has secured the right to do business over the Atchison, Topeka & Santa Fe system, which brought it to Chicago, and the absorption of the Erie Express completes the line to the Atlantic. The Wells-Fargo system now includes the Southern Pacific system, the Burlington & Missouri River, the Chicago & Northwestern west of the Missouri River, the Houston & Texas Central, Montana Central, Colorado Central, Atchison, Topeka & Santa Fe and the Erie, besides many short connecting lines, amounting in all to over 30,000 miles. We should suppose that this arrangement would be an advantageous one for the Erie. The receipts from express business have fallen off for the last three years from \$480,000 in 1885 to \$455,000 in 1887, and, in all probability, will be very considerably increased by the new arrangement. With the great mileage now controlled by Wells, Fargo & Co., it will be strange if they cannot throw a larger traffic over the lines of the Erie than has been secured by its independent company. At any rate, it is relieved of an auxiliary business which has been a burden, if not actually unprofitable.

A railroad bill has been introduced in the Dominion Parliament at Ottawa, in accordance with the recommendations of the Royal Commission, a brief abstract of whose report we gave last week, and it is thought that it will be passed. The bill is quite similar to the Inter-state law except the Railway Committee of the Privy Council is charged with its enforcement. The Committee is to employ agents or local commissioners in each Province to hear and investigate complaints and report to the Committee. The same department of the government will have full powers to settle disputes between railroads as to the use of each other's tracks and terminal facilities.

The Commission in its report recommends a general railroad law for the construction of new roads, as likely to give better results than special charters, "provided such general law contained provisions for securing the public from undertakings either uncalled for by the community or projected without adequate security for their *bona fide* prosecution."

By an act of the Legislature of Michigan in 1887, the railroad companies are permitted to use any automatic coupler which comes up to the standard fixed by the act of 1885, and which is approved by the Commissioner of Railroads. The earlier act requires that the automatic couplers shall couple with each other, and "with the link and pin coupler now generally in use." During the year 1887 the Commissioner of Railroads declined to authorize the use of the Janney because it could not be coupled with the ordinary link and pin coupler without going between the cars, and from the shape of the end of the drawhead seemed more than usually dangerous to couple by hand. Now, however, under date of Jan. 24, the Commissioner issues a circular approving and authorizing the use of the Janney, upon the application of the Grand Rapids & Indiana Railroad. He also approves, under date of March 15, of the use of the Dowling freight car coupler, application having been made by the Michigan Central.

It is gratifying to observe the growing practice of equipping the colleges of the country with apparatus for physical tests of materials, and the young men who are getting their education to-day should come out of the schools with more accurate knowledge of the properties of matter than could have been obtained by any generation which has preceded them. The University of Illinois announces, in a recent

circular, that its laboratory is now equipped with a Riehle testing machine of 100,000 lbs. capacity, having attachments for tensile, compressive and transverse tests. The laboratory also has an open mercury column, graduated to 215 lbs. per square inch, for testing pressure gauges. The testing laboratory now stands ready to make tests for the public and to furnish certified statements of the result. The schedule prices run from 50 cents to \$2 for each test. Specimens will be prepared if desired, at a charge of 30 cents per hour. Pieces to be tested may be sent to Prof. A. T. Woods, Prof. I. O. Baker, or other members of the technical faculty.

Among the 1,100 undergraduate students at Harvard University are 70 or 80 who need to work hard during the summer in order to have money enough to pay their way while studying. Mr. Frank Bolles, the Secretary of the University, in order to assist these students, tries each year to secure summer employment for them. A number of them wish to obtain places as conductors on parlor cars or as clerks in railroad offices, and Mr. Bolles writes us that he will be glad to hear of any chances for them.

If these young men are in earnest, as those who try to work their way through college generally are, their education ought to make them good material for the service they seek. Unfortunately for them, however, preference must be given to those who intend to make the occupation permanent, and we can think of no large field for these students in office work unless it be on the seashore railroads, such as those running to Coney Island. Most roads arrange to provide for their extra summer business by changes in their regular force, employing temporary men only in the very lowest grades. So long as winter excursions are no more numerous than they now are, the sleeping car companies will, we suppose, have to put on a considerable percentage of new men at the beginning of the busy summer season, but whether they wish to employ men who will not be candidates for permanent service we are unable to say. There is this to be considered, however, that the temporary employment of these young men may direct some of them to railroading as their future profession, and lead them to so direct their studies and reading that when they are graduated they will be high class material for clerks and apprentices.

The traffic through the Suez Canal for 1887 amounted to 5,903,024 registered tons (net). In the *Railroad Gazette* for March 4, last year, we gave a table comparing the registered tonnage passing through the St. Mary's Falls and the Suez canals from the time of opening each: The first was opened in 1855, and the Suez Canal in 1870. One year after its opening, the registered tonnage through St. Mary's Falls Canal was 101,458. In 1871 it was 752,101, and the tonnage through the Suez was 761,487. In 1882, the first year after the enlarged lock of the St. Mary's Canal was completed, the tonnages were 2,468,098 and 5,047,509. For the last two years they have been: For the St. Mary's Falls Canal 4,219,397, and 4,897,598; for the Suez Canal 5,767,656, and 5,903,024.

That is, the traffic of the Suez Canal has increased 2.4 per cent., and that of the St. Mary's Falls Canal, 16.1 per cent., and the latter is now doing in seven months nearly 83 per cent. of the business done by the Suez Canal in 12 months.

In our legal columns this week will be found two decisions of special interest to contractors. One is a New York case and the other one in Maryland. Another decision, in South Carolina, deals with a case where a bridge was authorized, provided that it be at least 42 ft. above the bed of the river. In the suit of the state against the railroad company it was shown that the bed of the river had slowly but constantly risen, and that the present bridge is not 42 ft. above it. Therefore the terms of the original act are not complied with. There are still other decisions of interest to engineers.

We have from Mr. W. Kennaway, New Zealand Government Office, 7 Westminster Chambers, Victoria street, London, a notice to the effect that he will receive communications from persons who are desirous of becoming candidates for the office of Chief Commissioner of Government Railways in New Zealand. An act has been passed placing the management of the New Zealand railroads under a board of commissioners, with duties similar to those of the Railway Board of Victoria, Australia. The salary of the Chief Commissioner is £2,500, and it is added that the intending candidates must have had wide experience in railroad management.

In answer to numerous inquiries, it is officially announced that the lines of the improved scientific coupler will be published on Thursday at noon, but whether before or after April 1, is uncertain.

The specification of the ten-wheeled freight engine, given in our last issue, contained the following errors: Diameter of smoke box at the front should be 58 in., not 55 in., and the thickness of the side and back sheets of the fire-box should be  $\frac{3}{8}$  in., not  $\frac{1}{2}$  in. The correct figures were shown in the engravings.

The Kalamazoo Railroad Velocipede & Car Co. has just issued a new catalogue of its productions. It contains cuts and descriptions of no less than 15 different styles of hand car and of the steam inspection car made by the company. Various details are also shown and described.

## TECHNICAL.

### Locomotive Building in Russia.

The Russian Government, soon after the introduction of railways, endeavored to have the engines and cars constructed in the country. When Czar Nicolas decreed the construction of the line from St. Petersburg to Moscow in 1842, he ordered at the same time that all the necessary supplies should be, as far as possible, purchased in Russia. Consequently the government entered into a contract in 1843 with Messrs. Harrison & Winans, the latter binding themselves to undertake the manufacture of locomotives and cars in the Alexandrow iron foundry, near St. Petersburg, the property of the government, and to teach Russian workmen this branch of engineering. The foundry was enlarged and provided with all necessary tools. The shops remained for 24 years, until 1867, under the direction of Messrs. Harrison & Winans, and in this period they delivered 192 locomotives, 253 passenger and 2,608 freight cars for the government. Eight locomotives were also built for the Volga-Don Railway, a private concern. In 1868 the Great Russian Railway Co. became the owner of the Nicolai line and terminated the Winans contract and converted the Alexandrow works into repair shops.

The works of the Duke Maximilian von Leuchtenberg also built 17 locomotives and turned out the first locomotive built in Russia. These works were, however, purchased by the Great Russian Railway Co. in 1857 and were closed. The locomotives and rolling stock required were therefore almost wholly imported, chiefly from Prussia, England, Austria and the United States.

In 1866 an imperial decree ordered that, to diminish to export of gold, the railway material needed by the government be built at home. To encourage the establishment of new works responsible parties were offered contracts for long terms and advances in money. The consequence of this offer was that contracts for 180 locomotives and 7,500 freight cars were entered into by the government with several Russian concerns, one of the principal conditions of the contract being that all raw materials be as far as practicable purchased at home. As a further assistance to the home manufacturers, in 1868 an import duty of 75 copecs per pood (1.58 cents per lb.), was placed on locomotives, which had been until then on the free list, and the uniform duty of 100 roubles (\$80) per car was raised to 200 roubles (\$160) for each freight and 300 roubles (\$240) for each passenger car. A premium of 3,000 (\$2,400) roubles for each locomotive built was also offered to all Russian works which for a period of 5 years could deliver at least 10 locomotives annually to private railway companies. This premium was, however, earned by one works alone. After these contracts, made in 1868 and 1869, had been executed, further contracts were made in 1874 and 1875 for 550 locomotives, 700 passenger and 20,500 freight cars, the clause concerning the use of home material being made more severe. These contracts were divided equally over six years: those contracting works which, during the first three years of the contracts, did not show that they had built for private companies at least the same number of engines and vehicles as they built for the government losing their right to a continuation of the contract for the other three years, unless otherwise ordered by the Minister of Public Works. The government, being unable to find a ready use for all the rolling stock which it had contracted to purchase in order to encourage home production, in 1877 an imperial decree ordered that stocking for future requirements be discontinued, and that in all new railway concessions the clause binding the companies to purchase all rolling stock at home be made imperative and that premiums be paid for the following five years to Russian works which delivered locomotives to private companies, the premium being \$2,400 for an eight-wheel locomotive and somewhat less for four and six-wheeled engines. To increase the protection to the home industry it was further ordered in 1879 that all duties on imports be paid in gold, which meant an increase of about 50 per cent. in the duty. A further increase in duty was made on cars in 1880 and on locomotives in 1882. These measures have enabled the Russian Government to cause a sufficient number of works to be established to supply all the requirements of the country. Special inspectors are appointed to supervise the work done for government delivery. The demand for rolling stock from private companies having diminished and many of the older companies, who had no clause in their concessions binding them to get their supplies at home, finding it more convenient to purchase abroad, the government was obliged, notwithstanding the order of 1877, to again enter the market as a purchaser in order to keep open the works it had induced to be established, and new contracts have been entered into, the new material being transferred by the government to the state railways or private companies when needed.—*Archiv. des Eisenbahnwesen.*

### Coal Handling Machinery.

The Philadelphia & Reading have adopted an improved method of handling coal at the Port Richmond coal wharves which is thus described by the *New York Herald*:

The coal reaches the yard from the mines, in drop-bottom cars, which enter the yard on gradually rising trestles, and at selected places the doors in the floor of the cars are opened and the coal drops into a trough beneath.

Running the length of this trough, iron lined, with sides slightly sloping toward the centre, is a strong, endless chain, into which are securely fastened, at intervals of 16 in., scrapers or hoes, 8 in. deep by 20 in. wide. This chain or conveyor, run by a steam engine, carries the coal along this horizontal trough to a chute where it drops into an incline conveyor which delivers the coal high up into a loading pocket, with screening attachments, and then drops it into cars on a trestle, which convey it down to the dock and drop it into the vessel. Here the labor and time saved are immense, when there is a vessel at each dock to which trestles lead.

The machine is of the utmost importance for storing coal in the yard. Similar troughs extend from the entering tracks to convenient points where the coal is to be piled. At any one of these points is a pole 80 ft. high; to the top of this is attached a head or traction wheel, over which passes the endless chain or conveyor, having a span of 200 ft. This is called a flying extension, and operates to trim and convey the coal dropped into the gutters or troughs at the lower end toward the head wheel. As the coal piles up it is shaped into a cone, having its apex at first under the lower strand, and if fed until it has conveyed the coal to its upper end, then under the head wheel, thus a pile will be formed 80 ft. high and 350 across, containing about 50,000 tons of coal.

Here again the saving over the old custom of piling the coal up by the barrow load is immense. For instance, the machine does the work at the rate of three tons per minute, or 1,800 tons in a day's work.

The attendants required to do this are only a "boss" and five laborers. By this system the storage capacity of the yard is greatly increased, for coal can be piled in heaps many times as high as was possible with manual labor, and



results in making a storage ground whose former maximum capacity was 30,000 tons accommodate 100,000 tons.

For reloading cars from a pile the conveyor is reversed and the coal is dragged down into the gutter, when the endless chain carries it along to an inclined conveyor and thence into the cars on the trestle tracks.

This ingenious but simple machinery will probably save several thousands of dollars in wages every week, for the "plant" is comparatively inexpensive and works rapidly with the assistance of very little manual labor.

It will also be possible to unload and reload cars so quickly they will be kept in uninterrupted service to and from the mines, and that there will be no interference with the loading of high vessels on account of tides, thus releasing them very much more promptly than by the old plan, for any number of vessels can be loaded from one pile of coal.

#### Melting Brass Filings.

A German exchange gives the following method of utilizing copper or gun metal filings: The filings are melted together with 5 lbs. oxide of manganese for every 100 lbs. of filings. For melting, the graphite crucibles are filled with alternate layers of manganese and filings, a layer of oxide of manganese  $\frac{1}{2}$  in. thick being first placed at the bottom of the crucible, then a layer of filings a little over 1 in. thick, then another layer of oxide, etc. When the metal is melted, the impurities rise to the surface and can be skimmed off. Fats, tallow, etc., should not be used for covering the crucible. Journals for parts of machinery running at high speed cast by the above method are said to wear well. The addition of oxide of manganese is also recommended for new castings,  $\frac{2}{3}$  lbs. of oxide being used for every 100 lbs. of metal.

### General Railroad News.

#### MEETINGS AND ANNOUNCEMENTS.

##### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Allegheny Valley*, annual meeting, Pittsburgh, Pa., April 10.
- Atchison, Topeka & Santa Fe*, annual meeting, Topeka, Kan., May 10.
- Catawissa*, annual meeting, Philadelphia, Pa., April 3.
- Calabasas, Tucson & North Western*, annual meeting, 22 Liberty street, New York City, April 3.
- Chicago & Alton*, annual meeting, Chicago, Ill., April 2.
- Chicago & Grand Trunk*, annual meeting, Chicago, Ill., April 11.
- Colorado Midland*, annual meeting, Colorado Springs, Col., April 2.
- Georgia Pacific*, special meeting, Birmingham, Ala., March 31.
- Joliet & Chicago*, annual meeting, Chicago, Ill., April 2.
- Kansas City, Clinton & Springfield*, annual meeting, Kansas City, Mo., April 7.
- Kansas City, Springfield & Memphis*, annual meeting, Kansas City, Mo., April 7.
- Morgan's Louisiana & Texas*, annual meeting, New Orleans, La., April 2.
- New York Central & Hudson River*, annual meeting, Union Depot, Albany, N. Y., April 18.
- New Jersey & New York Extension*, special meeting, New York City, April 5.
- Panama*, annual meeting, New York City, March 8.
- Southern Pacific*, annual meeting, San Francisco, Cal., April 4.
- Western New York & Pennsylvania*, special meeting, Philadelphia, Pa., March 27.

##### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

- Lehigh Valley*, quarterly,  $1\frac{1}{4}$  per cent.
- New York Central & Hudson River*, quarterly, 1 per cent., payable April 16.
- Sunbury & Lewiston*, 3 per cent., payable April 2.

##### Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

- Association of North American Railroad Superintendents* will hold its fifteenth annual meeting in New York City, April 9 and 10.
- The *General Time Convention*, spring meeting, will be held in New York, April 11.
- The *National Association of General Passenger and Ticket Agents* holds its annual meeting in St. Augustine, Fla., on March 20.
- The *Master Car-Builders' Association*, annual convention, Alexandria Bay, N. Y., commencing June 12.
- The *American Railway Master Mechanics' Association*, next annual convention, Thousand Islands, N. Y., June 19.
- The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.
- The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.
- The *Western Railway Club* meets in Chicago the third Wednesday in each month.
- The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.
- The *American Society of Civil Engineers* holds meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.
- The *Boston Society of Civil Engineers* holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.
- The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.
- The *Engineers' Club of St. Louis* meets the first and third Wednesday of each month till June.
- The *Engineers' Society of Western Pennsylvania* meets in Pittsburgh the third Tuesday of each month.

##### Civil Engineers' Society of St. Paul.

Regular meetings were held Feb. 13 and March 5. A paper was read by the President, being a report to the Council of Engineering Societies upon the methods of conducting public works in France and Germany. Another paper read was on the Public Domain of the United States and its History Relative to the Rectangular System of Surveying, which was illustrated by a map showing all the principal meridians used in surveys in the states north of Ohio and east of the Missouri.

The following members were elected: S. D. Mason, G. N. Miller, S. T. Norvell, G. E. Ingersoll. Mr. Waddell's specifications were approved in general terms. The Committee on the National Board of Public Works was instructed to

send a delegate to the next meeting of the Council, to be held in Chicago.

##### Western Society of Engineers.

A regular meeting was held March 6. The following were elected members: Charles B. Parsons, S. Lee Heidenreich and Robert A. Shailer. A resolution was passed urging upon Congress the desirability of an appropriation for automatic rain gauges. Concerning Mr. Waldell's pamphlet on specifications for highway bridges, it was not thought to be in the province of the Society to recommend the adoption of the specifications of any individual. The committee reporting on this subject suggested that improvements in the character of highway bridges can be brought about by the following means: The governor of each state to appoint an engineer whose duty it shall be to examine and report on existing bridges, with authority to condemn unsafe structures, and to act as expert adviser to the Legislature. Cities and counties should be encouraged to employ engineers who are bridge specialists to prepare specifications and detail plans, and tender should be received on the basis of these specifications and plans. It was recommended that, to facilitate the adoption of this method, engineers should agree upon a scale of minimum rates for doing such work. The committee on National Public Works stated that the report upon the proposed legislation will be issued in a few days.

##### Car Axle Manufacturers.

A committee of the car axle manufacturers of the United States held a conference at the Weddell House, Cleveland, to arrange for a general meeting at the same place on the 28th inst. Some master car-builders and master mechanics will be present in the interest of the railroads, and an attempt will be made to adopt standard specifications and tests for freight and passenger car axles.

##### Master Car-Builders Association.

The following circular has just been issued by the Committee on Journal Lubrication and the Best Practice for Economizing Oil. The information received will be utilized in preparing a report for the convention to be held in June, 1888.

1. What kind of oil or grease do you use for lubricating journals of passenger cars?
2. What kind for freight cars?
3. Have you made any tests to determine the relative cost of lubricating journals with pure petroleum and with mixtures of petroleum and animal oils? If so, please give conclusions.
4. Have you experimented with any form of dust guard other than the M. C. B. standard? If so, and you have secured satisfactory results, please send drawings of the dust guard.
5. What are your views as to the best methods to be pursued for the purpose of economizing oil in lubrication of car journals?

Replies to be addressed to J. W. Cloud, Buffalo, N. Y.

J. W. CLOUD, }  
H. ROBERTS, } Committee.  
J. N. LAUDER, }

##### Railway Accounting Officers.

A special meeting of this organization is called for Wednesday, March 28, at 11 a. m., at the Arlington Hotel, Washington, D. C. The Chairman is M. Reibenack, Pennsylvania Railroad, Philadelphia, Pa., and the Secretary Jos. W. Cox, Norfolk & Western, Roanoke, Va. The special occasion of this meeting is to consider the proposed form of annual report which the Auditor of the Inter-state Commerce Commission has forwarded to the railroad companies. A request is made that the railroad companies from which the Inter-state Commission will require annual reports shall send representatives to the Washington meeting.

#### PERSONAL.

—Hon. John P. King, who for nearly 40 years was President of the Georgia Railroad, died at Augusta, Ga., March 19, aged 89 years.

—C. W. Fisher, late General Manager of the Chicago, Kansas & Nebraska, has started on a tour of Europe, and expects to be gone about five months.

—Dr. William T. Barnard, Assistant to the President of the Baltimore & Ohio and President of the Telegraph Company, has tendered his resignation.

—Cornelius Shields, late Superintendent of the Montana Division of the St. Paul, Minneapolis & Manitoba, has been appointed General Superintendent of the Chicago, St. Paul & Kansas City.

—Major James A. Sangston, of Memphis, Tenn., formerly Southern Passenger Agent of the Illinois Central, has entered the service of the Kalamazoo Railroad Velocipede Co. as traveling salesman.

—Mr. E. H. Goodman, who was connected with the Pullman Palace Car Co. for 18 years, and since August, 1886, as Second Vice-President, has been appointed Assistant General Manager and General Agent of the Union Switch & Signal Co., of Pittsburgh, Pa.

—Mr. George R. Blanchard's salary has been raised, says a Chicago dispatch, from \$12,000 to \$25,000 per year. This is said to be in consequence of an offer Mr. Blanchard received to come east, but whether it was from the Martha's Vineyard or the Bridgeton & Saco River is not learned.

—Ex-Gov. Horace Fairbanks, of Vermont, died at the Fifth Avenue Hotel in New York, March 17, of pneumonia. Gov. Fairbanks was President of the St. Johnsbury & Lake Champlain Railroad. His prominent place in the business community and his high personal character are well-known.

—David McCargo, who succeeds W. A. Baldwin as General Manager of the Pennsylvania lines west of Pittsburgh, has been connected with the railroad service for 31 years, having begun as Superintendent of Telegraph of the Pennsylvania and also Assistant Superintendent of the Pittsburgh Division. Since then he has held the position of superintendent on several roads. In 1875 he was appointed General Superintendent of the Allegheny Valley, which place he has since held. He is 53 years old.

—George W. Cass died at his residence in New York, March 21, at the age of 78. Gen. Cass was graduated from the West Point Military Academy in 1832, and resigned from the army in 1836. Soon after this he was appointed by President Jackson as one of the engineers to construct the great national road, in which he was engaged until it was completed through Virginia. He formed the Adams Express Co. in 1849 by consolidating the lines between Boston, Richmond and St. Louis, and was elected the first President of the consolidated company. He was also at one time President and Receiver of the Northern Pacific. In 1856 he was elected President of the Ohio & Pennsylvania and also President of the Pittsburgh, Fort Wayne & Chicago, with which he was connected for 26 years.

#### ELECTIONS AND APPOINTMENTS.

*Alabama, Florida & Atlantic.*—The officers and directors of this company are as follows: President, John C. Graff, New York City; Secretary, Albert Matthews, Montclair, New Jersey. Directors: John C. Graff, New York City; Dudley Benn, Mount Vernon, N. Y.; Albert Matthews, Montclair, N. J.; Zimri West, New York City; Samuel B. Vrooman, Philadelphia, Pa.

*Arizona Central.*—The incorporators of this Arizona company are Morris R. Locke, Jerseyville, Ill.; W. C. Masten, Kansas City, Mo.; C. S. Masten, DeForest Porter, Frank Baxter, J. T. Dennis and D. P. Conroy, all of Phoenix, Ariz.

*Baltimore & Ohio.*—The following officers have been elected: First Vice-President, Orland Smith, headquarters Baltimore, Md.; Third Vice-President, C. K. Lord, Baltimore. Frank Harriott is promoted to be General Freight Traffic Manager for all lines, with office at Baltimore. Charles E. Ways is General Freight Agent of the Eastern system, with office at Baltimore, and C. S. Wight of the Pittsburgh division and lines west of the Ohio River, with office at Pittsburgh.

*Boston & Lowell.*—G. E. Cummings has been appointed Trainmaster of the White Mountain Division, with headquarters at Woodsville, N. H.

*Boston & Maine.*—George E. Sturtevant has been appointed Auditor of Passenger Accounts, and William Allen Auditor of Freight Accounts, with headquarters in Boston.

*Brunswick & Chillicothe.*—The following directors were elected at the annual meeting held in St. Louis: W. H. Blodgett, D. S. H. Smith, Jas. F. Hoar, Geo. M. Rice, E. P. Burnham, Joseph Kimball and Chas. M. Hays.

*Cairo & Northwestern.*—The following are the officers of this company: Charles O. Patier, President; Fredolin Bross, Vice-President; Henry Wells, Secretary; Albert Lewis, Treasurer, Cairo, Ill.

*Centralia & St. Genevieve.*—The following are the officers of this company: T. B. Needles, President, Nashville, Ill.; J. M. McCutcheon, Treasurer, Monmouth, Ill.; Henry W. Schmidt, Chief Engineer, Sparta, Ill.

*Chatham.*—At the annual meeting held in Chatham, Mass., last week the old board of directors was re-elected as follows: Marcellus Eldridge, Osborne Nickerson, Charles Bassett, Alvin Z. Atkins and Collins Howes. Hon. Marcellus Eldridge, of Portsmouth, N. H., was re-elected President, and Charles Bassett Secretary and Treasurer.

*Chicago, Kansas City & Omaha.*—The incorporators of this company are: Walter Brown, W. H. Miller, James H. Austin, Kansas City, Mo.; Byron Judd, D. R. Emmons, W. R. Ford, of Kansas City, Kas.; and A. L. Williams, of Topeka.

*Chicago, St. Paul & Kansas City.*—Cornelius Shields has been appointed General Superintendent, with office in St. Paul, Minn.

*City (New York).*—The directors of this New York company are: William W. Cryder, William N. Armory, William H. Devlin, M. Carrington, Douglas Alexander, Douglas Cryder, James E. Chandler, C. Lawrence Perkins, Peter T. Barlow, Solomon Handford, Stephen H. Olin, of New York; James E. Bedell, of Brooklyn, and Samuel L. M. Barlow, of Glen Cove.

*Delaware, Lackawanna & Western.*—P. F. Daly has been appointed Traveling Passenger Agent, with headquarters at Buffalo, N. Y.

*Denison, Bonham & New Orleans.*—The officers of this Texas company are as follows: S. B. Allen, President; W. B. Munson, Vice-President; Edward Perry, General Manager; W. A. Nunnelee, Treasurer; H. T. V. Perry, Secretary. The general office is at Denison, Tex.

*Denver, Fort Worth & Gulf.*—Frank M. Burrows has been appointed Traveling Passenger Agent, with headquarters at Fort Worth, Tex.

*Durham & Northern.*—John C. Winder, Raleigh, N. C., is President of this company, and W. W. Vaso is Secretary and Treasurer.

*Illinois Central.*—At the annual election the following directors were elected: Sidney Webster, Robert Goeltz, S. V. R. Cruger and J. C. Welling, the latter to succeed James C. Clark, resigned.

*Jacksonville & East Tennessee.*—Incorporated in Florida by J. C. Rutherford, A. O. Bacon, W. M. Wimberly and others of Macon, Ga.

*Kanawha & Ohio.*—Robert W. Kelly has been elected President of the company, vice Nelson Robinson, resigned.

*Little Rock & Alexandria.*—The following officers have been elected: S. M. Markle, of St. Joseph, Mo., President; John B. Jones, of Little Rock, Ark., Secretary; Col. B. W. Johnson, of Pine Bluff, Ark., Vice-President.

*Long Island.*—P. C. Poulson has been appointed Division Superintendent, with headquarters at Babylon, L. I. He was formerly in the maintenance department.

*Louisville, New Albany & Chicago.*—The following board of directors was re-elected at the annual meeting held in New York this week: John J. Astor, Samuel Sloan, R. G. Rolston, James Roosevelt, William Dowd, Elihu Root, James D. Smith, H. H. Cook and Richard King, of New York; Robert R. Hitt, C. R. Cummings and John B. Carson, of Illinois, and J. M. Fetter, of Kentucky. The board re-elected William Dowd, President; John B. Carson, Vice-President and General Manager; W. H. Lewis, Secretary and Treasurer.

*Louisville, St. Louis & Texas.*—The following are the officers of this company: J. C. Fawcett, President; J. K. McCracken, Secretary and Treasurer; Wm. Patton, Chief Engineer. General offices, Louisville, Ky.

*Mississippi Railroad Commission.*—The commission has organized at Jackson, with J. F. Session as President and F. S. Scruggs Secretary.

*Missouri Pacific.*—J. T. Jones has been appointed Master Mechanic of the St. Louis, Wichita & Western and its branch roads, with headquarters at Fort Scott, Kan.

*Montana Central.*—W. J. Footner has been appointed Manager of Express Traffic.

*Mountain View.*—The following are the officers of this company: President, George W. Baxter; Vice-President, S. H. Stitt; Treasurer, William Hunt; Secretary, George M. Baxter. The general office is at Hot Springs, Ark.

*Newport, Jonesboro & St. Louis.*—The following officers have been elected: E. L. Watson, President; George W. Decker, Secretary and Treasurer; Felix Simmons, Chief Engineer, Newport, Ark.

*New York, Rutland & Montreal.*—William V. Reynolds has been appointed Receiver.



**Northwestern Ohio.**—At the annual meeting held in Toledo, O., last week the following directors were elected: Thomas D. Messler, J. N. McCullough, W. Thaw, John W. Renner, R. F. Smith, George W. Layng and Frank Jones.

**Pacific in Nebraska.**—Church Howe has been elected Vice-President. The general offices will be removed from Superior, Neb., to Hastings.

**Pennsylvania Company.**—David McCargo has been appointed Manager, with headquarters at Pittsburgh, Pa., vice W. A. Baldwin, resigned.

**Pensacola Short Line.**—The following have been elected officers of this company: President, Gen. John McNulta, Chicago, Ill.; Treasurer, Samuel W. Allerton, Chicago, Ill.; General Manager, T. McNulty, Mobile, Ala.

**Pittsburgh, Chautauqua & Lake Erie.**—The following officers have been elected for this newly consolidated company: President, W. Ives Parvin; Vice-President, Geo. P. Orr; Secretary, F. Morck; Treasurer, A. J. Davis; Chief Engineer and General Manager, G. C. Hamilton.

**Pittsburgh, Cincinnati & St. Louis.**—The following directors were elected at the annual meeting: G. B. Roberts, Henry H. Houston, Wistar Morris, J. N. Du Barry, John Prince Wetherell, John P. Green and William H. Barnes, of Philadelphia, Pa.; J. N. McCullough, William Thaw, Thomas D. Messler and James McCrea, of Pittsburgh, Pa.; Robert Sherrard, Jr., and George W. McCook, of Steubenville, O.

**Princeton, Marion & Ohio.**—The following officers have been elected: R. W. Wilson, President; I. W. Blue, Sr., Vice-President; I. W. Blue, Jr., Secretary; I. Calvin Elder, Jr., Treasurer. The general offices are at Marion, Ky.

**Rio Grande & Utah.**—The following are the officers of this road: J. W. Conley, President; Benj. L. Cook, Vice-President, Chicago, Ill.; Edgar C. Long, Treasurer and Secretary, St. Paul, Minn.

**Rockport, Booneville & Princeton.**—The incorporators of this company are as follows: Thomas P. Hardy (President), John G. Eigenmann, Charles Lieb, Elias E. Wesseler, Joseph S. Winn, Thomas E. Snyder, Levi C. Laubery, Sidney W. Stockney, and Hiram M. Logsdon, of Rockport, Ind.

**Rome & Decatur.**—The following officers and directors have been elected: Eugene Kelly, President; J. W. Ogden, Vice-President; R. L. Edwards, Treasurer; F. M. Barnum, Secretary, all of New York City. Directors: Eugene Kelly, J. W. Ogden, R. L. Edwards, James Swann, R. N. Hazard, Geo. A. Evans, Wm. Libby, New York City; J. C. Pimtop, J. H. Reynolds, T. F. Howell, Rome, Ga.; R. B. Kyle, Gadsden, Ala. The Receiver is Judge R. T. Dorsey, Atlanta, Ga.

**St. Louis & Hannibal.**—The following directors were elected at the annual meeting held in St. Louis, March 14: John I. Blair, Blairtown, N. J.; Percy R. Pyne, D. C. Blair, S. S. Palmer and E. C. Case, New York.

**San Bernardino Central.**—The following are the incorporators of this California company: A. E. Chapman and John C. Monteith, of San Diego; A. B. Hotchkiss and W. S. Hale, of Colton; and J. W. Freble, of Riverside.

**Savannah & Tybee.**—The following directors were elected at the annual meeting held in Savannah, Ga.: D. G. Purse, S. P. Hamilton, H. Blun, J. H. Estil, H. Myers, J. C. Rowland, J. J. McDonough. D. G. Purse was elected President and J. J. McDonough Vice-President.

**Seattle, Lake Shore & Eastern.**—The construction department has transferred the road to the operating department and the following appointments have been made: W. R. Thornell, General Manager, vice C. M. Sheafe, resigned; Paul Mohr, of Spokane Falls, Chief Engineer, vice J. C. Scurry, resigned; Frederick Allen, Auditor.

**Tennessee & Coosa.**—E. A. Quintard, of New York, has been elected President, vice L. Wyeth, resigned.

**Tuscaloosa Northern.**—At the annual meeting the old board of directors were re-elected and J. S. Rainey, New Orleans, La., added to the board.

**Union Pacific.**—Thomas G. Kimball has been appointed Acting General Manager, vice T. J. Potter, deceased. J. S. Cameron has been appointed Traffic Manager.

**Wheeling & Harrisburg.**—At the annual meeting held in Wheeling, W. Va., the old board of directors were re-elected. Judge R. H. Cochran is President of the company.

**Wichita, Springfield & Trinidad.**—The incorporators of this Kansas company are as follows: Joseph Wesby, L. P. Roberts, John F. Van Vorhes, J. V. Lycan, T. Pierce, W. J. Tipton, of Springfield, Kan.; B. B. Brown, of West Plains, Kan.; S. N. Wood, F. F. Stevens, of Richfield, Kan.

#### OLD AND NEW ROADS.

**New Companies Organized.**—Arizona Central. Chicago, Kansas City & Omaha. Jacksonville & East Tennessee. City, Phillipsburg, Granite & Cable. Rockport, Booneville & Princeton. San Bernardino Central. Suwanee, Wichita, Springfield & Trinidad.

**Alabama, Florida & Atlantic.**—The company proposes to build a road from the southeast coast of Florida at Turtle Harbor, along the east coast to Rockledge, then diagonally across the state through Ocala and Tallahassee to Bronson, and then through Ozark and Troy, Ala., to Montgomery, a distance of over 650 miles. Seventy-five miles of the road are under contract, 30 miles of which are ready for tracklaying. The officers are given in another column.

**Arizona Central.**—Chartered in Arizona to build the following extensions of the Maricopa & Phoenix from Phoenix, the present terminus: east to Globe, on the proposed Tucson, Globe & Northern; north to Prescott, on the Prescott & Arizona Central, and southwesterly to Yuma, on the Southern Pacific. The three lines aggregate about 310 miles.

**Arizona Mineral Belt.**—Preliminary surveys have been made from Fulton, southeast to Globe, on the proposed Tucson, Globe & Northern, a distance of about 140 miles. The road is at present in operation from Flagstaff, on the Atlantic & Pacific, south 35 miles to Fulton, and an additional two miles are ready for the track. The general offices of the company are at Flagstaff, Ariz.

**Baltimore & Ohio.**—President Spencer has made the following statement of the condition of the road: Floating debt March 1, 1888, \$6,446,173; equipment, to be constructed in the company's shop, \$1,400,000. The company now wants \$10,000,000, \$5,000,000 for the syndicate, \$3,500,000 for improvements and \$1,500,000 for floating debt.

**Cairo & Northwestern.**—This company proposes to construct a road from Cairo, Ill., in a northwesterly direction to East Cape Girardeau, Ill.

**Canadian Pacific.**—A preliminary survey has been

made for an extension from Toronto southwest about 60 miles to Brantford, Ont., on the Grand Trunk.

**Central Iowa.**—The Illinois Division was sold at public auction in Chicago on March 17, to James Munson, of New York, for \$300,000, of which \$25,000 was deposited. The road runs from Peoria, Ill., west to Keithsburg, on the Mississippi, west of the Peoria connections of the Iowa Division of the Central Iowa Road, crossing the Mississippi at Keithsburg. If the sale is approved the amount realized will be applied to the redemption of certain of the bonds and the payment of interest and other outstanding liabilities of the road.

**Central of New Jersey.**—Judgment has been entered against the company in Philadelphia for \$80,000 for back taxes for the years 1878 to 1884 due the state.

**Centralia & Ste. Genevieve.**—The grading has been completed for 31 miles between Sparta, Ill., and Centralia. F. M. Gillett, New York, is the contractor. The line will be located to the Mississippi River in about a month. The road is projected to extend southwest from Centralia through Sparta, to the Mississippi River, at a point opposite Ste. Genevieve, about 69 miles in a direct line; also, northeast from Centralia to Terre Haute, Ind., about 112 miles.

**Charleston, Cincinnati & Chicago.**—This road is being built by the Massachusetts & Southern Construction Co. from Charleston, S. C., northwest through Camden, Lancaster and Blacks, S. C., Rutherfordton, Marion and Johnson City, Tenn., Estillville, Va., Pikeville and Richmond Ky., to the Ohio River at Ashland, a distance of 600 miles. Branches will also be built from Lancaster north to Charlotte, N. C., 40 miles; Blacks south to Augusta, Ga., 130 miles, and Rutherfordton south to Spartanburg, S. C., 30 miles; a total distance of 800 miles. At present the road is in operation between Ashland and White House, Ky., 60 miles, and between Rutherfordton and Blacks, 45 miles. The line from Charleston, S. C., to Marion and Asheville, N. C., will probably be opened for business in July, 1888. Between Camden and Lancaster but seven miles of track remain to be laid. All the preliminary surveys have been finished. Seven corps of engineers are now making the location north of Marion, N. C., and one between Augusta, Ga., and Shelby, N. C., 70 miles of which have already been graded. Contracts for new work will be let about July 1. R. A. Johnson, 45 Broadway, New York, is General Manager, and T. E. Matson, Rock Hill, S. C., is Chief Engineer.

**Chicago, Kansas City & Omaha.**—Incorporated in Kansas to construct a road from Kansas City, Kan., through Wyandotte County, Kan., across the Missouri River into Platte County, Mo., thence in a general northeast direction through the counties of Platte, Clay, Clinton, Caldwell, Livingston, Grundy, Sullivan, Adair, Knox, Lewis and Marion, to a point opposite Quincy, Ill., a distance of about 240 miles. The capital stock has been placed at \$5,700,000.

**Chicago, Hannibal & Springfield.**—The engineers have completed the survey from California, Mo., on the Missouri Pacific, southwest to Versailles, 21 miles. Another corps is surveying the route from Versailles toward Springfield, and has reached Duroc, Benton County, near the Osage River.

**Chicago, Milwaukee & St. Paul.**—It is stated that it is intended to construct a road from Prairie du Sac, Wis., north about 25 miles to Kilbourne, on the line between Milwaukee and St. Paul.

The statement that the contract had been let for the building of an extension from Chamberlain, Dak., to the Black Hills, is pronounced by officers of the company to be without foundation.

The charter has been filed for the extension of the Wisconsin Valley division north about 35 miles to the Gogebic ore region in Michigan.

**City (New York).**—Incorporated in New York to construct an underground road, beginning at South street, in the City of New York, and crossing under the lower part of Broadway to the west side and through the blocks to the district between Sixth and Seventh avenues and thence to Fifty-ninth street at the foot of the Boulevard. The ultimate intention is to continue the line underground to the Harlem River and thence through the annexed district to the town of New Rochelle, the entire distance being 20 miles.

**Cleveland & Canton.**—The work of widening the gauge of the road is progressing as rapidly as the weather will permit. The roadbed has been widened and the bridges are being strengthened.

**Columbus & Western.**—The work on the Oak Mountain Tunnel will probably be finished this week. The track-laying will begin as soon as it is cleared, and will be continued on to the Coosa Mountain Tunnel.

**Coshocton & Southern.**—The contract for building this road has been awarded to Paige, Carey & Co., of Yonkers, N. Y., and Akron, O. The road is an extension of the Cleveland & Canton, and will extend from Coshocton, O., south about 30 miles to Zanesville. At the latter point it will connect with the Columbus & Eastern. This will open a new line from Cleveland to Columbus.

**Dayton, Fort Wayne & Chicago.**—R. D. Marshall has been appointed Receiver and has assumed control of the property. J. E. Gumperling was appointed General Manager, but all present officers were retained.

**Denison, Bonham & New Orleans.**—The road has been graded from Denison to Bonham, and is ready for the rails, with the exception of three small bridges, which are not yet in place. The bonds, which are issued at the rate of \$15,000 per mile, will soon be put on the market.

**Denver, Fort Worth & Gulf.**—The last spike to complete this road was driven on the evening of March 14, on the Fort Worth & Denver City Division, at a point 523 miles from Fort Worth, Tex., and 285 miles from Denver.

The new line from Denver to Galveston is composed of the Denver, Texas & Gulf, from Denver, Col., to Pueblo, 125 miles; the Denver, Texas & Fort Worth from Pueblo to the Texas state line, 225 miles (100 miles of which, from Pueblo to Trinidad, is formed by the laying of a third rail along the Denver & Rio Grande), and the Fort Worth & Denver City from the Texas state line to Fort Worth, Tex., 449 miles, a total mileage of 809 miles.

The outstanding securities of the Northern division of the Denver, Texas & Gulf are comprised in its first mortgage 5 per cent. bonds at the rate of the 125 miles of main line and 13 miles of a little less than \$22,000 per mile of branches. On the middle division there will be issued probably \$16,000,000 of capital stock, which, at the rate of \$20,000 per mile, would cover the entire line of road from Denver to Fort Worth; and there will also be issued upon this division \$4,000,000 5 per cent. gold bonds, of which \$1,000,000 will be applicable to the third rail from Pueblo to Trinidad; 200,000 for the purchase of terminals at Pueblo and Trinidad, and the balance on the main line of the company's road, and such coal branches as it may decide to build.

On the Fort Worth & Denver City the outstanding securities consist of \$8,086,000 of first mortgage 6 per cent. 40 year gold bonds, which is the entire amount the company is authorized to issue, it having by a supplemental mortgage agreed to put out no more than \$18,000 per mile on its total mileage of main track (449 miles), and agrees to issue no bonds on any branches or extensions. The capital stock of the Fort Worth & Denver City outstanding is \$8,985,000, the majority of which being in the control of the company will be hereafter exchanged for the stock of the Denver, Texas & Ft. Worth, the middle division of the road. Traffic arrangements have been made with the Union Pacific, the Missouri Pacific and the Atchison, Topeka & Santa Fe.

**Duluth, Huron & Denver.**—A dispatch from Minneapolis states that it is supposed there that this line will pass under control of the Northern Pacific. The company owes \$210,000 for surveys and grading. Parties supposed to be acting for the Northern Pacific have offered \$18,000 for the charter and right of way, and \$132,000 towards paying off the indebtedness of the company. If the creditors accept the offer, it is supposed that the arrangement will be made.

**Duluth, South Shore & Atlantic.**—The main line will be completed from Sault Ste. Marie, Mich., to a connection with the Northern Pacific at Iron River, a point within 43 miles of Duluth, very soon. There remain but 43 miles of main track to lay, and all the roadbed is graded and bridged, so that early in June the main line will be completed to the connection with the Northern Pacific, making a continuous line from Sault Ste. Marie and St. Ignace, Mich., to Duluth, Wis. The extension from L'Anse southwest to a connection with the Ontonagon & Brule, near Rockland, a distance of about 30 miles, is now being surveyed. Surveys are also being made for an extension of about 15 miles from the main line through the Gogebic Ore Range, striking it about Sunday Lake, and then running to or near Bessener, and thence to Ironwood and Hurley, traversing the best portion of the Gogebic iron territory. The location of a line from Iron River, parallel to the Northern Pacific, to West Superior, is also in progress, and it is thought the company may possibly build its own line into Duluth from Iron River. The contracts for the L'Anse and Gogebic Iron Range extensions will doubtless be let in a few weeks. Large numbers of locomotives and freight and passenger cars, amounting to \$1,000,000, have been purchased and will be delivered this summer. J. A. Latcha, Marquette, Mich., is the Chief Engineer, and has charge of the letting of construction contracts.

**Duluth, Wilmar & Sioux Falls.**—The survey has been completed for an extension from Sioux Falls, Dak., southwest to Yankton, a distance, in a straight line, of 60 miles. The road is a branch of the St. Paul, Minneapolis & Manitoba.

**Durham & Northern.**—W. P. Fortune & Co. have contracted to build 13 miles of this road. It is to be constructed from Durham, on the Richmond & Danville, northeast to Henderson on the Raleigh & Gaston, a distance of 40 miles.

**East Louisiana.**—The surveys for the extension from Covington, La., north to Franklinton, about 25 miles, have been commenced, and construction work will begin when they are finished. John Poitevant, New Orleans, La., is President.

**East Tennessee, Virginia & Georgia.**—It is rumored that the company will buy the Cincinnati, Selma & Mobile.

**Farmville & Charlottesville.**—A subsidy of \$100,000 has been voted the company by Prince Edward County, Va.

**Fort Worth Western.**—The line has been surveyed from Fort Worth, Tex., for 328 miles northwesterly towards Albuquerque, N. M., and 200 miles of this have been located. The contract from Fort Worth to Springtown, about 30 miles, has been let to Eugene Roche. It is proposed to construct 100 miles of the road this year. It is bonded for \$15,000 per mile and capitalized at \$10,000 per mile. W. H. H. Lawrence, Fort Worth, Tex., is the president of the company.

**Fremont, Elkhorn & Missouri Valley.**—McDonald & Penfield, Fremont, Neb., have received the contract to build an extension from Geneva south to the Kansas state line. Geneva is the terminus of the Seward Line, 101 miles southwest of Fremont, Neb.

**Fresno, Belmont & Yosemite.**—This company, lately organized, proposes to construct a road from Fresno City, Cal., northeasterly about 50 miles. Part of the contracts may be let this month. With the exception of the first 20 miles the grades are heavy. E. C. Winchell, Fresno City, Cal., is President.

**Garnerville.**—Organized in New York to build a road from the terminus of the New Jersey & New York at New City, Rockland County, N. Y., to West Haverstraw and then along the tracks of the West Shore for some distance and then northeast to the Hudson River. John Taylor, Garnerville, N. Y., is President.

**Great Western Air Line.**—This is the name of the company which proposes to construct the road from Charlotte to Weldon, N. C., reported in our issue of March 9.

**Gulf, Colorado & Santa Fe.**—The company will probably build a 30-mile branch road from Ballinger, Tex., southwest to San Angelo, in Tom Green County.

**Henderson, Hartford & Knoxville.**—It is stated that the company has made arrangements for constructing its road, which is projected to extend from Henderson, Ky., southeast 35 miles to Hartford, and then to Bowling Green, on the Louisville & Nashville, about 50 miles further. From Bowling Green it may be extended into East Tennessee.

**Illinois Central.**—The action of the Board of Directors authorizing the issue of \$15,000,000 bonds, was ratified by the stockholders at the annual meeting held in Chicago March 19.

**Jacksonville & East Tennessee.**—Incorporated in Florida to construct a road from Jacksonville north to the Georgia State Line. The road will be part of the proposed extension of the East Tennessee, Virginia & Georgia from Jesup, Ga., to Jacksonville.

**Kansas City, Arkansas & New Orleans.**—It is stated that financial arrangements for building the road have been made and that construction work would soon commence. The final location is now progressing. George M. Barbour, Beebe, Ark., is President.

**Kansas City & Pacific.**—The road has been located from Selma, Kan., the present terminus, northeast to Paoli, in Miami County, about 35 miles, and then northeast toward Belton, Jackson County, Mo. C. H. Kimballs, Parsons, Kan., is Vice-President.

**Kansas City, Rich Hill & Southern.**—The final survey will be completed in a few days, when the contracts for the construction of the road will be let. The general offices of the company are at Rich Hill, Mo.



**Kentucky.**—Bills have been introduced in the Legislature to incorporate the following companies: Smithland, Erin & Deatur; Kentucky & Missouri Bridge Co.; Owensboro & Rockport; Carroll & Eminence; Bellevue & Cincinnati Tunnel & Bridge Co., to build a bridge across or a tunnel under the Ohio River, with W. A. Goodman and others as incorporators; the Frankfort & Lawrenceburg; Owensboro, West Louisville & Seabree City, and Bowling Green & Owensboro.

**Lehigh Valley.**—The directors have authorized an increase of 20 per cent. in the capital stock of the company, or about \$6,619,600 which will be allotted to the present stockholders proportionately at par. This will make the aggregate capital of the company about \$39,717,950. The new capital will be used in payment for the Roselle & South Plainfield, lands recently acquired at Jersey City, terminals now being constructed at that point, additional equipment, increase of the lake fleet, etc.

**Louisville & Nashville.**—It is stated that a survey is being made for an extension from Clarksville south to Dickson, on the Nashville, Chattanooga & St. Louis, an air line distance of 30 miles.

**Mann's Boudoir Car Co.**—St. Louis papers report that the Wagner Palace Car Co. has made an offer to buy this company's cars and business, and that the negotiations for the transfer are nearly completed.

**Marietta, Karshner & Washington.**—The Marietta, Columbus & Lake Erie has offered to construct this new road if the right of way and depot grounds and \$75,000 are donated. The road is projected to extend from Marietta, O., to Washington C. H. N. P. Cutler, Marietta, O., is president of both companies.

**Meridian, Brookhaven & Natchez.**—The road was sold this week to the Illinois Central for \$11,250.

**Mexican Central.**—The Guadalajara Branch was put in operation this week from the junction with the main line at Irapuato to Ocotlan, a distance of 113 miles. The distance from Ocotlan to Guadalajara, the terminus of this division, is about 47 miles, which will be covered temporarily by stage route. The track is laid 12 miles beyond Ocotlan, leaving only 35 miles more to be built in order to complete rail connection with Guadalajara. It is expected that this will be done during May.

**Midland Peninsular.**—It is reported that it is the intention of the company to commence the survey for the road early in April. It is projected to extend from Fond du Lac, Wis., southwest through Waupun, Beaver Dam and Sun Prairie to Madison, a distance of about 70 miles. D. C. Lamb, Fond du Lac, is interested.

**Mississippi.**—Bills have been introduced in the legislature to incorporate the following companies: Chicago Railroad & Construction Co.; Greenville & Durant; Brookhaven, Columbia & Mobile.

**Mississippi Valley.**—The location for this road has been completed, but construction work will not be commenced for some months. The road is projected to extend from Arkansas City, Ark., to West Baton Rouge, La., a distance of 260 miles. A mortgage for \$20,000 per mile has been executed with the Farmers' Loan & Trust Co., of New York, as trustee. Hiram R. Steele, Vidalia, La., is President.

**Natchitoches.**—Preliminary surveys have been made for an extension from Natchitoches north to a point on the Vicksburg, Shreveport & Pacific. The portion from Natchitoches to the Red River, a distance of 15 miles, will probably be built before summer. The contracts have not yet been let. W. W. Logan, Natchitoches, La., is President.

**New London Northern.**—It is stated that the Brattleboro & Whitehall Branch will be extended to Whitehall, Vt., and that present improvements in the line are being made with the view of changing the gauge to standard.

**New Roads.**—A road is projected from Dedham, Mass., westerly through West Dedham and Dover to Sherborne, a distance of about 10 miles.

A road is projected from Bonne Terre, St. Francois County, Mo., northeast to Crystal City on the Mississippi River.

**Newport, Jonesboro & St. Louis.**—Preliminary surveys have been made from Newport, Ark., northeast to Gilkerson, 39 miles, and the right of way is being secured. The road passes through timber and farming lands. The contract will be let when the right of way is secured and financial arrangements completed.

**New York & New England.**—A survey will soon be made for a line from Needham, Mass., on the Woonsocket division, southeast to Dedham on the main line. This will allow of running trains of the Woonsocket division into the company's own station in Boston. They now go in over the Boston & Albany from Newton.

**New York, Providence & Boston.**—The company has applied for authority to construct a connection with the New York & New England between Olneyville and Valley Falls, R. I. The object seems to be the securing of a connection (or the possibility of one) with Boston, independent of the Boston & Providence.

**Ohio Valley.**—Work on the extension southeast from Princeton, Ky., to Hopkinsville, about 30 miles, will soon be commenced.

**Pensacola Short Line.**—The engineers are now engaged in making the surveys for this road from Pensacola, Fla., west to Navy Cove, on the eastern shore of Mobile Bay, Ala., and construction work will commence when they are finished. The company has been granted the right of way through Pensacola. The road is a branch of the Birmingham, Mobile & Navy Cove. T. McNulty, Mobile, Ala., is the General Manager of both companies.

**Phillipsburgh, Granite & Cable.**—Organized to construct a road from Phillipsburgh, Mont., south through Granite to Cable.

**Pioneer & Ohio River.**—This company, reported as incorporated last week by A. L. Maxwell and others of Knoxville, Tenn., proposes to construct a road from Knoxville, Tenn., northwest to a point near Winfield on the Cincinnati Southern.

**Prescott & Arizona Central.**—Surveys are being made for an extension from Prescott, Ariz., to Phoenix, on the Maricopa & Phoenix, a distance of 110 miles. A. S. Bullock, Prescott, Ariz., is President.

**Princeton, Marion & Ohio River.**—The preliminary surveys of this road have been completed. The contracts have not yet been let. The road extends from Marion, Ky., northwest to the Ohio River, opposite Elizabethtown, Ill., about 16 miles. When completed the road will be a link in a shorter route between St. Louis and Nashville, Tenn., for the St. Louis, Alton & Terre Haute,

which will extend the Eldorado division of the St. Louis & Cairo Short Line to Elizabethtown.

**Rockport, Boonville & Princeton.**—Articles of incorporation filed in Indiana to build a road from Rockport, Spencer County, on the Louisville, Evansville & St. Louis northwest through Boonville to Princeton, both on the same road. The distance is about 45 miles. The capital stock is \$750,000, of which 15 per cent. has been subscribed.

**St. Louis & Central Illinois.**—The contract for building the extensions from Bates, Ill., northeast to Springfield, 13 miles (between which points the company now uses the tracks of the Wabash), and also from Newbern to Alton, has been let to Johnson Bros. & Fought, Alton, Ill. The name of the road will be changed to St. Louis, Alton & Springfield. It is bonded at \$12,000 per mile 5 per cent. gold bonds. The Farmers' Loan & Trust Company, New York, is the trustee.

**St. Louis & Chicago.**—Tracklaying will be completed from Litchfield, Ill., to Mount Olive in a week or two, and the ties are being distributed as far as Edwardsville, 22 miles from Litchfield. Trains will run over the tracks of the Toledo, St. Louis & Kansas City (the gauge of which is being changed), to St. Louis. The road at present is in operation from Springfield, Ill., west to Litchfield, 45 miles.

**St. Paul, Jennings, Lake Arthur & Gulf.**—This company, lately organized, will build a road from Lake Arthur, Calcasieu County, La., 10 miles north to Jennings, on the Galveston, Harrisburg & San Antonio, and then to Alexandria, on the Texas & Pacific, 75 miles from Jennings. E. R. Sharkland, Jennings, La., is President.

**San Antonio & Aransas Pass.**—The branch which leaves the main line at Yoakum, Tex., has been completed north from Flatonia 20 miles to West Point on the Missouri Pacific.

**San Bernardino Central.**—Incorporated in California to construct a road from San Bernardino, Cal., south through Colton to South Riverside, a distance of about 30 miles. The capital stock is \$540,000.

**San Diego, Cuyamaca & Eastern.**—The San Diego & Cuyamaca has reorganized, with a capital stock of \$1,000,000, under the above name. The company has decided to build a road in a northeasterly direction to Dos Palmas, on the Southern Pacific, about 90 miles, and then on to The Needles, on the Atlantic & Pacific and the Colorado River, about 120 miles from Dos Palmas, and also a branch of about 35 miles to the Julian mine, a total of 245 miles. Gov. Waterman is interested in the company.

**San Francisco & North Pacific.**—A large force is at work on the extension from Cloverport, Cal., the present terminus, north about 30 miles, to Ukiah. It is about half completed and will probably be finished during July. There are five tunnels on the route, varying in length from 250 ft. to 1,850 ft. On one, 1,350 ft. long, the work is completed, and but 30 per cent. remains to be done to complete the longest one.

**Santa Ana, Fairview & Pacific.**—Grading is in progress on this road between Santa Ana, Cal., and Fairview, a distance of eight miles. The road will be extended to Newport Harbor. W. A. Coles, Santa Ana, Cal., is Secretary.

**Savannah, Florida & Western.**—Work has been commenced on an extension of this road, to be built from Thomasville, Ga., south to Tallahassee, Fla.

**Seattle, Lake Shore & Eastern.**—The tracklaying has been completed to Kelsey Landing, about 30 miles from Seattle, W. T., and it will probably reach the Gilman coal mines, 10 miles further, next week. A 10-mile extension from Gilman will be completed about April 15. F. H. Whitworth, Seattle, is Chief Engineer.

**Shreveport & Arkansas.**—Tracklaying will probably be completed to Benton, in Bossier County, La., next week and to Shreveport, 10 miles further south, early in April. The line is projected from Lewisville, Ark., on the St. Louis, Arkansas & Texas, south to Shreveport.

**South Pacific Coast.**—W. P. Dougherty, of Santa Cruz, is constructing a seven-mile road from Boulder Creek, Cal., on this road, into the redwood lumber district and three miles have been completed.

**Suwanee.**—Incorporated in Florida to build a railroad from Ellaville, on the Florida Railway & Navigation Company's road, to Suwanee River at the head of navigation, where connection will be made with steamers for Cedar Keys and points on the gulf coast.

**Texas, Sabine Valley & Northwestern.**—This road has been completed from Mineral Springs, Tex., southeast to Carthage in Panola County, about 22 miles from Longview, from which point it starts. It is stated that it may possibly be extended south to Sabine Pass, on the Gulf of Mexico, and also build several short branches. The road is the reorganized Galveston, Sabine & St. Louis. The general offices are at Longview, Tex.

**Toledo, St. Louis & Kansas City.**—The work of changing the gauge between Frankfort, Ind., and East St. Louis, 245 miles, will soon be commenced. The road has already been widened between Toledo and Frankfort, a distance of 206 miles.

The Red and Canada Southern fast freight lines now operate over this road.

**Walden's Ridge.**—The grading on the extension of this narrow gauge road from Oliver Springs, Tenn., northeast to Clinton, about 10 miles, has been completed, and track-laying will be commenced shortly.

**Wells, Fargo & Co.**—The Erie Express was sold to this company, and control was assumed March 16, under a 15 years' contract. The terms of the sale, so far as published, are, 40 per cent. of gross receipts to be paid to the New York, Lake Erie & Western, and the property to be taken at an appraisement. The purchase gives Wells, Fargo & Co. a line to the Atlantic, which they formerly had only by the other companies from Chicago. Wells, Fargo & Co. operate about 30,000 miles of railroad lines, including the Erie system.

**Wichita, Springfield & Trinidad.**—Chartered in Kansas to construct a road from Wichita, west through the counties of Sedgwick, Kingman, Pratt and Kiowa, then south to Comanche, and then west through Clark, Meade, Seward, Stevens, and Morton, to Richfield, near the Colorado state line, an estimated distance of 240 miles. The capital stock is \$1,500,000.

**Wisconsin Central.**—The contract for building a 15-mile extension north from Marshfield, on the main line, to Ashland, has been let to W. H. Upham. The contract has been in part sublet.

It is stated that the right of way is being secured for a branch from Rib Lake, Wis., northeast to Tomahawk Lake, about 70 miles.

## TRAFFIC AND EARNINGS.

## Western Rates.

All the roads west, northwest and southwest of Chicago seem now to have agreed to a restoration of rates, several of them having formally issued the notice referred to last week, which provides for an advance on March 26. The Southwestern lines have agreed to the action taken by the others, and the Chicago, Burlington & Quincy, which adhered to its previously expressed determination of not agreeing to any advance until all the questions in dispute were fully discussed and settled, is now reported to have agreed to make the same advance as the other roads; it will, however, not put the new tariff into effect until April 1. It is said that the St. Louis & San Francisco and the Kansas City, Fort Scott & Gulf have also agreed to join in the movement for restoration. It seems doubtful whether the Chicago, Burlington & Northern will be willing to charge as high as the other roads' rates on flour and grain from Minneapolis and St. Paul. The Chicago-St. Louis rate war, which began before the general demoralization, was quietly terminated a week ago.

## East-bound Shipments.

The shipments of flour, grain, provisions, hides, wool and lumber for the week ending March 17 amounted to 55,852 tons, against 54,022 tons the preceding week, and against 66,917 tons during the corresponding week of 1887;

Lines.	1888.	1887.
Wabash.....	5,720	10.2
Cincinnati, Indianapolis, St. Louis & Chicago.....	2,096	3.7
Michigan Central.....	4,208	7.5
Lake Shore & M. S.....	6,811	12.1
Pittsburgh, Ft. W. & C.....	9,510	17.0
Chicago, St. Louis & Pittsburgh.....	7,780	13.9
Baltimore & Ohio.....	3,809	7.1
Chicago & Grand Trunk.....	8,583	15.3
N. Y. C. & St. L.....	3,221	5.5
Chicago & Atlantic.....	4,114	7.7

Of the above shipments 13,367 tons were flour, 29,240 tons grain, 3,343 tons cured meats, 1,664 tons lard, 1,678 tons hides, 130 tons wool and 5,108 tons lumber.

## Cotton.

The cotton movement for the week ending March 16 is reported as follows, in bales:

Interior markets:	1888.	1887.	Inc. or Dec.	P. c.
Receipts.....	26,114	37,155	D.	11.941
Shipments.....	43,732	73,647	D.	29.885
Stock.....	284,870	200,914	I.	83.956
Exports:				
Receipts.....	47,333	57,716	D.	10.383
Exports.....	60,691	137,736	D.	71.045
Stock.....	767,978	654,784	I.	113.194

## Railroad Earnings.

The following is the comparative statement of the operations of the Nashville, Chattanooga & St. Louis for the month of February and the eight months ending Feb. 29:

Month of February:	1888.	1887.
Gross earnings.....	\$248,835	\$249,461
Operating expenses.....	146,535	136,025
Net earnings.....	\$102,300	\$113,436
Interest and taxes.....	62,735	61,364
Improvements.....	12,934	17,807
Surplus.....	\$26,632	\$34,266
Eight months ending Feb. 29:		
Gross earnings.....	\$2,121,279	\$1,811,523
Operating expenses.....	1,187,119	1,049,507
Net earnings.....	\$934,160	\$772,016
Interest and taxes.....	498,942	478,798
Improvements.....	92,511	62,371
Surplus.....	\$342,706	\$230,847

The statement of the earnings and expenses of the New York Central & Hudson River and its leased lines for the quarter and six months ending March 31, is as follows, 1888 being estimated:

Three months to March 31:	1888.	1887.
Gross earnings.....	\$8,176,000	\$8,089,351
Operating expenses.....	5,725,000	5,508,895
Net earnings.....	\$2,451,000	\$2,580,456
First charges.....	1,953,000	1,957,360
Profit.....	\$498,000	\$623,096
Dividend (1 per cent.).....	894,000	894,283
Deficiency.....	396,000	271,026
Six months ending March 31:		
Gross earnings.....	\$18,200,000	\$17,110,607
Operating expenses.....	12,200,000	10,967,644
Net earnings.....	\$6,000,000	\$6,142,963
First charges.....	3,907,000	3,914,400
Profit.....	2,093,000	2,228,563
Dividend.....	1,788,000	1,788,560
Surplus.....	305,000	439,997

The following comparative statement of the earnings, expenses and fixed charges of the Cincinnati, Indianapolis, St. Louis & Chicago for the month of January is made:

	1887.	1888.	Inc. or Dec.
Gross earnings.....	\$216,167	\$204,932	D. \$11,236
Operating expenses.....	128,366	133,695	I. 5,329
Net.....	\$87,801	\$71,237	D. \$16,565
Less pro. of taxes.....	4,915	5,000	I. 85
Net less taxes.....	\$82,886	\$66,236	D. \$16,650
Deduct fixed charges, less income from investments.....	47,925	33,333	D. 14,592
Surplus.....	\$34,961	\$32,903	D. \$2,058
Add surplus to Dec. 31.....	237,857	304,604	I. 66,747
Total surplus, 7 months.....	\$272,818	\$337,507	I. \$64,689

The annual report of the Chicago, St. Paul, Minneapolis & Omaha, for the year ending Dec. 31, 1887, shows:

	1887.	1886.	Inc.
Gross.....	\$6,940,873	\$6,153,267	\$787,606
Expenses.....	4,633,615	3,848,375	785,240
Net.....	\$2,307,258	\$2,304,892	\$2,366
Fixed charges.....	1,388,390	1,390,693	*1,931
Balance.....	\$918,559	\$914,062	\$4,497
Received from lands.....	654,501	741,066	\$86,565
Total.....	\$1,573,060	\$1,655,128	*\$82,068
Dividends.....	675,408	675,408	
Surplus.....	\$897,652	\$979,720	*\$82,068

\*Decrease.



Earnings of railroad lines for various periods are reported as follows:

Month of January:				
	1888.	1887.	Inc. or Dec.	P. c.
Bur. C. R. & No.	208,245	220,208	D. 11,963	5.4
Net.	31,982	55,966	D. 23,984	42.0
Cairo, Vin. & Chi.	56,452	57,721	D. 1,269	2.2
Net.	11,501	10,376	I. 1,125	10.8
Chi. B. & Q.	1,671,294	1,985,365	D. 314,071	15.8
Net.	375,643	9,0342	D. 541,599	58.9
Den. & R. G.	589,437	545,650	I. 43,787	7.5
Net.	156,163	211,749	D. 55,586	26.2
Lou. N. O. & T.	241,528	218,061	I. 23,467	10.8
Net.	81,081	84,307	D. 3,226	3.9
Mexican Central.	512,042	421,820	I. 90,222	21.4
Net.	253,310	213,899	I. 39,410	18.4
Oreg. R. & N. Co.	275,598	274,229	D. 1,369	0.5
Seab. & Roan.	48,575	40,432	I. 8,143	20.1
Net.	16,369	13,435	I. 2,934	21.9
Scioto Valley	54,073	56,224	D. 2,151	3.8
Net.	11,306	10,341	I. 1,065	10.4
Southern Pac. Co.	2,330,998	1,661,017	I. 669,981	40.3
Pacific System.	682,822	640,160	I. 42,662	6.7
Net.	3,246,775	2,407,815	I. 838,960	35.1
Total of all.	932,476	797,341	I. 135,135	17.0
Net.				
Total (gross).	\$6,896,009	\$6,223,597	I. \$672,412	10.8
Total (net).	1,895,076	2,357,176	D. 462,100	19.6
Net.				

Two months—From Jan. 1 to Feb. 29:

	1888.	1887.	Inc. or Dec.	P. c.
Atlantic & Pac.	\$409,877	\$394,105	I. \$15,772	4.0
Bur. C. R. & No.	295,785	255,173	I. 40,612	15.9
Net.	429,245	416,146	I. 13,099	3.1
Cairo, V. & Chi.	109,227	108,487	I. 740	0.7
California South.	320,474	240,629	I. 79,845	32.9
Canadian Pac.	1,617,205	1,154,139	I. 463,066	40.2
Gen. of Georgia.	1,036,557	845,408	I. 191,149	22.7
Central of Iowa.	203,912	206,735	D. 2,823	1.4
Ches. O. & S. W.	307,912	270,403	I. 37,509	13.9
Chi. & Atlantic.	292,210	290,895	D. 1,315	0.5
Chi. & East. Ill.	316,826	296,352	I. 20,474	6.9
Chi. & Ind. Coal.	85,540	58,790	I. 26,750	45.5
Chi. Mil. & St. P.	3,020,000	3,015,211	I. 4,789	0.2
Chi. & Ohio R.	251,697	107,716	I. 143,981	134.4
Chi. St. P. & K. C.	181,907	151,643	I. 30,264	20.0
Chi. & W. M.	65,986	56,321	I. 9,665	17.4
Cin. J. & Mack.	462,694	443,480	I. 19,214	4.4
Cin. N. O. & T. P.	226,144	217,297	I. 8,847	4.1
Ala. Gt. South.	123,036	106,380	I. 16,656	15.7
N. Ori. & N. E.	75,437	85,812	D. 10,375	12.1
Vicks. & Mer.	77,160	93,117	D. 15,957	17.2
V. Shre. & P.	52,323	52,323	I. 0	0.0
Chi. R. & C.	108,255	162,843	D. 54,588	33.3
Chi. & Springfield.	344,013	343,504	I. 509	0.1
Cin. W. & Balt.	75,288	63,309	I. 11,979	19.0
Cleve. Ak. & Col.	599,241	574,041	I. 25,200	4.4
C. C. & C. I.	47,670	47,506	I. 164	0.3
Cleve. & Mar.	46,374	53,445	D. 7,071	13.3
C. & Cin. Mid.	290,060	434,152	D. 144,092	8.6
Col. H. & T. & T.	1,098,900	1,087,035	I. 11,865	1.1
Den. & R. G. W.	149,834	120,484	I. 29,350	24.5
Den. & R. G. W.	69,205	50,479	I. 18,726	37.3
Det. Lan. & No.	130,092	141,131	D. 11,039	7.9
Du. S. S. & At.	143,356	155,556	D. 12,200	8.5
E. Ten. Va. & G.	800,482	720,815	I. 79,667	11.1
Ev. & Indianap.	33,896	35,565	D. 1,669	4.7
Ev. & Terre H.	130,144	121,982	I. 8,162	6.7
Flint. & P. M.	381,523	344,893	I. 36,630	10.6
Fla. Ry. & N. Co.	165,051	161,028	I. 4,023	2.5
Fl. Worth & D. C.	133,255	77,658	I. 55,597	71.5
Georgia Pacific.	212,189	175,553	I. 36,636	20.8
Gr. Rapids & Ind.	306,062	295,901	I. 10,161	3.4
Other lines.	27,559	14,519	I. 13,040	90.0
Grand Tr. of Can.	2,145,396	2,363,151	D. 217,755	9.2
Houston & T. C.	320,082	320,082	I. 0	0.0
Ill. C. (J. & S. Div.)	1,769,393	1,793,454	D. 24,061	1.3
Ced. F. & M.	13,301	14,831	D. 1,530	10.3
Dub. & Sioux C.	130,021	114,035	I. 15,986	14.0
I. F. & S. City.	95,813	92,581	I. 3,232	3.5
Ind. Dec. & Spr.	52,203	70,472	D. 18,269	25.9
Jack. T. & K. W.	107,196	111,488	D. 4,292	3.8
K. C. Ft. S. & G.	342,969	365,557	D. 22,588	6.1
K. C. Sp. & Mem.	243,969	275,490	D. 31,521	12.9
K. C. Cl. & Spr.	33,854	35,192	D. 1,338	3.8
Kentucky Cent.	142,717	131,423	I. 11,294	8.7
Keok. & West.	53,988	48,741	I. 5,247	10.8
Kings. & Pemb.	21,938	14,242	I. 7,696	55.0
Lake E. & W.	289,823	283,178	I. 6,645	2.4
Lehigh & H. R.	34,759	41,446	D. 6,687	19.1
Long Rock & Mem.	115,270	136,655	D. 21,385	18.6
Long Island.	349,254	312,541	I. 36,713	11.8
Lou. Ev. & St. L.	154,133	126,964	I. 27,169	21.4
Louisv. & Nashv.	2,573,782	2,398,232	I. 175,550	7.3
L. N. A. & Chi.	285,166	281,090	I. 4,076	1.4
L. N. O. & Tex.	448,357	390,288	I. 58,069	14.9
Mem. & Charles.	274,233	258,155	I. 16,078	6.2
Mexican Central.	977,690	808,583	I. 169,107	20.9
Mexican Railway.	633,329	575,214	I. 58,115	10.1
Mil. L. S. & W.	277,639	301,456	D. 23,817	7.9
Mil. & Northern.	137,597	129,369	I. 8,228	6.4
Minn. & St. L.	186,908	221,211	D. 34,303	18.6
Mobile & Ohio.	409,965	436,513	D. 26,548	6.1
Nat. Jack. & Col.	29,151	29,431	D. 280	1.0
N. Y. C. & H. R.	5,304,187	5,169,541	I. 134,646	2.6
N. Y. Ont. & W. R.	212,493	176,571	I. 35,922	20.3
Norfolk & West.	708,742	555,896	I. 152,846	27.5
Northern Pacific.	1,670,549	1,071,149	I. 600,400	56.1
Ohio & Miss.	600,355	606,347	D. 5,992	0.9
Ohio River.	52,031	32,631	I. 19,400	59.5
Ohio Southern.	106,888	69,404	I. 37,484	54.0
Pitts. & West.	265,920	275,104	D. 9,184	3.3
Rich. & Danv.	796,559	704,500	I. 92,059	13.1
Va. Mid. Div.	249,557	206,481	I. 43,076	20.9
Char. C. & A.	173,457	148,309	I. 25,148	17.0
Col. & Gr. Div.	134,274	111,358	I. 22,916	20.6
West. N. C. Div.	107,349	99,486	I. 7,863	7.9
Wa. O. & M.	15,075	12,437	I. 2,638	21.2
Ashev. & Spa.	16,449	5,951	I. 10,498	176.4
St. L. A. & T. H.				
Main Line.	302,393	311,628	D. 9,235	3.0
Branches.	132,867	140,930	D. 8,063	5.5
St. L. A. & T.	439,084	330,060	I. 109,024	32.9
St. L. & San P.	783,637	783,521	I. 116	0.0
St. P. & Duluth.	146,050	180,770	D. 34,720	19.2
St. P. M. & Man.	1,037,436	894,060	I. 143,376	16.1
San A. & Aran. P.	47,508	47,508	I. 0	0.0
Shenandoah Val.	109,100	14,908	I. 5,808	5.1
St. Is. Rap. T.	84,173	80,291	I. 3,882	4.7
Texas & Pacific.	1,014,815	984,142	I. 30,673	3.1
Tol. A. A. & M.	21,217	21,217	I. 0	0.0
Tol. & O. Cent.	134,274	163,090	D. 28,816	21.5
Tol. P. or W.	138,819	130,314	I. 8,505	6.5
Wabash West.	765,100	84,498	I. 58,098	7.2
West N. Y. & P.	41,759	37,957	I. 3,802	10.0
Wheeling & L. E.	141,045	105,894	I. 35,151	33.2
Wisconsin Cen.	469,460	437,957	I. 31,503	7.2
Total.	\$44,896,313	\$41,864,803	I. \$3,031,510	7.2
Net.				

Three months—Jan. 1 to March 31:

N. Y. C. & H. R.	8,176,000	8,089,351	I. 86,649	1.1
Net.	2,451,000	2,580,456	D. 129,456	5.0

Six months—Oct. 1 to March 31:

N. Y. C. & H. R.	18,200,000	17,110,607	I. 1,089,393	6.3
Net.	6,000,000	6,142,963	D. 142,963	2.4

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

### Anthracite Coal Tonnage.

The anthracite coal tonnage for the month of November and the two months of this year is reported by John H. Jones Chief of Bureau, as follows:

February—				
	1888.	1887.	Inc. or Dec.	P. c.
Phila. & Reading	214,314	502,043	D. 287,729	
Central RR. of N. J.	361,164	352,626	I. 8,538	
Lehigh Valley	834,316	480,615	I. 353,701	
Del. Lack. & West.	614,302	482,483	I. 131,819	
Del. & Hud. Canal Co.	419,102	344,361	I. 74,741	
Pennsylvania	748,434	225,106	I. 523,328	
Pennsylvania Coal Co.	157,381	97,604	I. 59,777	
N. Y., L. E. & W.	69,409	66,165	I. 3,244	
Total.	2,528,322	2,551,003	D. 22,681	
From Wyoming Region.	2,021,973	1,434,854	I. 587,119	
Lehigh	52,250	469,349	D. 357,099	
Schuylkill	454,069	706,800	D. 252,731	
Two months—				
	1888.	1887.	Inc. or Dec.	P. c.
Phila. & Reading	308,786	1,002,433	D. 693,647	
Central RR. of N. J.	690,927	590,358	I. 100,569	
Lehigh Valley	890,248	890,248	I. 0	
Del. Lack. & West.	1,258,166	832,719	I. 425,447	
Del. & Hud. Canal Co.	110,987	700,001	D. 589,014	
Pennsylvania	665,236	478,611	I. 186,625	
Pennsylvania Coal Co.	280,906	176,837	I. 104,069	
N. Y., L. E. & W.	136,573	123,206	I. 13,367	
Total.	4,784,014	4,794,316	D. 10,302	
From Wyoming Region.	3,930,270	2,634,969	I. 1,295,301	
Lehigh	100,272	756,372	D. 656,100	
Schuylkill	753,471	1,402,974	D. 649,503	

The stock of coal on hand at tide-water shipping points Feb. 29, 1888, was 232,501 tons; on Jan. 31, 1888, 95,168 tons; increase, 137,333 tons.

This statement includes the entire production of anthracite coal, excepting that consumed by employees and for steam and heating purposes about the mines, but does not represent the entire anthracite coal tonnage actually transported by the respective railroad companies, adjustment being necessary in the compilation to avoid duplications, etc.

### Coal.

The coal tonnages for the week ending March 17 are reported as follows:

	1888.	1887.	Inc. or Dec.	P. c.
Anthracite	323,695	670,709	D. 347,014	51.7
Bituminous	367,330	290,784	I. 76,546	26.3

The coal and coke tonnages of the Pennsylvania road originating on the lines east of Pittsburgh and Erie, for the week ending March 10, and the year to that date, were as follows:

	Coal.	Coke.	Total.
Total week ending Mar. 10, 1888.	242,128	63,433	305,561
Total year 1888 to date.	2,311,133	770,855	3,081,988
Total year 1887 to date.	1,932,735	859,127	2,811,862

On the United Railroads of New Jersey Division the anthracite tonnage for the same periods was as follows:

	1888.	1887.	Decrease.
Total for week.	23,049	33,818	D. 10,769
Total for the year.	310,920	340,302	D. 29,382

For the week ending March 17 and the year to that date the tonnages east of Pittsburgh and Erie were as follows:

	Coal.	Coke.	Total.
Total for week ending March 17.	142,193	59,783	201,976
Total year 1888 to date.	2,453,326	830,638	3,283,964
Total for year 1887 to date.	2,165,297	941,267	3,106,564

On the United Railroads of New Jersey Division the tonnage for the same periods were as follows:

	1888.	1887.	Dec.
Week, March 17.	17,704	35,151	17,447